The Broader Effects of New Housing Supply: Movers, Prices, and Workplaces

Marco Giacoletti* University of Notre Dame

Matthijs Korevaar† Erasmus University

Franklin Qian‡ UNC-Chapel Hill

Abstract

We provide novel evidence on the effects of relaxing housing supply constraints by studying a large-scale policy implemented by the Dutch government in the mid-1990s. Using unique micro-data linking housing, mobility, and labor markets, we examine the development of hundreds of new suburban neighborhoods. Land allocation was determined centrally and was unrelated to pre-policy local price growth, providing credible identification. The new neighborhoods attracted high-income individuals, who became owner-occupiers, while their previous homes were taken up by lower-income movers. New supply reduced house prices primarily in nearby high-income neighborhoods and boosted local employment, especially in high-earning occupations.

*University of Notre Dame, Mendoza College of Business. Email: mgiacole@nd.edu

†Erasmus School of Economics. Email: korevaar@ese.eur.nl

‡University of North Carolina Kenan-Flagler Business School. Email: franklin_qian@kenan-flagler.unc.edu

1 Introduction

The stock of single-family homes in the U.S. has experienced sluggish growth, compared to new household formation, since the Great Recession.[1] A substantial body of research ties the persistence of limited new housing supply, despite evidence of strong demand and high prices, to factors that restrict land availability for development, such as physical and regulatory constraints (e.g., Gyourko, Saiz, and Summers, 2008; Saiz, 2010; Davis and Ortalo-Magne, 2011; Nathanson and Zwick, 2018; Baum-Snow and Han, 2023; D'Amico et al., 2025). Counterfactual analyses based on quantitative general equilibrium models predict that relaxing these constraints would significantly reduce housing costs, promote neighborhood mobility, and potentially increase local productivity (Duranton and Puga, 2013; Glaeser and Gyourko, 2014; Hsieh and Moretti, 2019). However, recent work questions the extent to which supply constraints can actually explain differences in house price growth across metropolitan areas (Louie, Mondragon, and Wieland, 2025).

Measurement challenges are central to this debate. In the U.S., policies that expand developable land or reduce barriers to construction are typically enacted at the local level, making them endogenous to local economic conditions. Even when such policies are adopted, their impact can be muted by local opposition, due to the incentives of local authorities (Favilukis and Song, 2023). Recent studies address these challenges by using variation in prices and rents within narrow radii around newly constructed buildings (Mast, 2022; Bratu, Harjunen, and Saarimaa, 2022; Pennington, 2022).[2] These research designs credibly identify the effects of localized development projects. However, they leave open questions about broader effects of large-scale interventions. What is the magnitude of price and mobility responses to large housing supply expansions? And what are the implications of households' relocations for workplaces and the spatial distribution of jobs?

The goal of this paper is to provide empirical evidence directly addressing these fundamental questions. We study the effects of the VINEX program, which was a large-scale, top-down initiative undertaken by the Dutch government. The program designated extensive areas of land for housing development near major cities, after several decades of tight restrictions on such construction.[3] This resulted in the construction of hundreds of thousands of homes and, by our estimates, the relocation of roughly 10% of the Dutch population, either directly or indirectly. Crucially, the allocation of VINEX land was plausibly exogenous to

[1] See, for example, this analysis by the Brookings Institute.

[2] Some studies also explore migration chains (sequences of moves) initiated by household moving into a new development (Mast, 2022; Bratu, Harjunen, and Saarimaa, 2022).

[3] The term VINEX stands for VIerde Nota Ruimtelijk Ordening EXtra, which translates from Dutch to "Addition to the Fourth Spatial Planning Memorandum."

the characteristics of nearby neighborhoods and is not explained in the data by differences in pre-policy price growth. This feature allows us to identify the effects of new housing supply by comparing more- and less-exposed neighborhoods within the same urban region.

We find that new housing supply had significant effects on prices, mobility, and local labor markets. However, these effects crucially depended on the nature of development and on local housing market segmentation.

VINEX areas primarily attracted demand from high-income households and were largely built out as suburban, owner-occupied single-family homes. VINEX units were on average larger than those elsewhere, and compared to the rest of the country, movers into VINEX neighborhoods were older, more likely to work in high-earning sectors, and more likely to become homeowners after relocating. The residences they left behind were occupied by individuals with average characteristics similar to the rest of the national population. Price effects on pre-existing neighborhoods were heterogeneous: large in high-income areas, but muted in low-income ones. This heterogeneity is consistent with the evidence on VINEX movers, and suggests that VINEX neighborhoods mainly served as substitutes for housing stock in more affluent areas. The new neighborhoods also generated large labor market spillovers, with strong job growth in areas surrounding VINEX developments, particularly in high-paying sectors.

Overall, the program fostered greater local clustering of high-income individuals and high-wage employment, likely stimulating local economic activity but also amplifying within-city inequality.

We believe that the VINEX program is uniquely interesting because of four key reasons. First, it is a large expansion of land available for development, which allows us to study the large-scale effects of easing housing supply constraints. Second, the timing of the VINEX program was determined by national-level decisions reflecting aggregate housing demand rather than local market conditions. Third, due to the institutional structure of planning in the Netherlands, the exact spatial allocation of these developments within metropolitan areas was not market-driven. Fourth, through Statistics Netherlands and other sources, we have access to extensive micro-data on house prices, individual job occupations, as well as individual addresses and moves (changes of address). We use these data to paint a comprehensive picture of the policy effects.[4]

Historically, post-war urban planning in the Netherlands has been highly centralized, with key decisions made at the national government level. In the decades preceding the VINEX

[4]The level of detail and granularity of the data matches that of contemporaneous work on the spatial sorting of individuals within specific metropolitan areas (e.g., Ahlfeldt et al., 2025), but has broader coverage, spanning the entirety of the Netherlands.

program, government policy sought to limit urban sprawl around large cities to preserve agricultural lands, directing new housing construction toward smaller towns and cities, or rejecting development projects altogether. This policy stance resulted in very limited housing construction near major urban centers. Following mounting public pressure, the VINEX program was established in 1991, and construction began in 1995. The program represented a significant shift in policy, allocating large areas of land for new residential developments.

Our empirical tests use data from the Randstad, which is a high-population-density area of the Netherlands, encompassing roughly half of the country's population, and the metropolitan areas of Amsterdam, Rotterdam, The Hague, and Utrecht, as well as the surrounding cities.

Between 1995 and 2010, the number of new housing units developed per VINEX neighborhood in the Randstad was, on average, more than three times larger than that for non-VINEX neighborhoods, while before 1995, VINEX neighborhoods saw little or no development. As mentioned, the program largely re-entitled farmland to land for housing development. Although there was a nationwide shortage of single-family housing, the spatial allocation of VINEX neighborhoods does not appear to have been guided by local unmet demand. Between 1991 and 1994, areas within 5 km of future VINEX sites did not experience faster price growth than other locations in the same municipalities.

The newly developed units tended to be larger and more expensive than the existing stock in the surrounding neighborhoods. These new homes attracted movers who, compared to those in the rest of the country, had on average higher income, were older, and had a higher chance of being owner-occupiers rather than renters. These movers also had a higher likelihood of being employed in sectors belonging to Tradable Services, which earn higher wages than sectors belonging to Agriculture, Manufacturing, or Non-Tradable Services (consistent with evidence for the U.S. from Hanson and Moretti (2025)).

We next examine the effects of new VINEX supply on pre-existing neighborhoods. A key challenge is that every metropolitan area in our data received VINEX land allocations and subsequent construction. Thus, our approach relies on the idea that neighborhoods located near large shares of VINEX land were more exposed to its effects than those farther away. Specifically, we define as "highly exposed" those neighborhoods with a high concentration of VINEX land (top quartile within their municipality) located within a 5-Km radius.[5] We measure exposure using land shares rather than developed-unit shares within the radius, since land allocations were determined by regulators prior to the full realization of demand, whereas unit development reflects endogenous market forces. Combined with the fact that

[5]We choose the 5-Km radius because it is likely to capture both direct migration from non-VINEX neighborhoods to VINEX, as well as competition for new residents between VINEX and surrounding non-VINEX neighborhoods.

VINEX sites did not exhibit higher pre-VINEX price growth, this approach enables us to identify the effects of new VINEX supply on local housing and labor markets.

We then test how outcomes of interest in the highly exposed neighborhoods have diverged from those in other (control) neighborhoods after the beginning of VINEX development, in 1995. We present estimates using two control groups: (i) all non-highly exposed neighborhoods, and (ii) a restricted sample of neighborhoods with zero VINEX land within 5-Km. Our results are robust across these two alternative specifications.[6] Our regressions include neighborhood fixed effects and municipality-by-year fixed effects. The latter absorb municipality-wide trends, enabling us to identify differential outcomes between highly exposed and less-exposed neighborhoods within the same municipality.

High exposure to a VINEX neighborhood persistently reduces house prices by 2-3 percentage points relative to other areas in the same municipality. Using proximity to VINEX neighborhoods as an instrument, we estimate a local price elasticity of -0.1, implying that a 10 percentage point increase in supply induced by the VINEX program lowers prices by about 1 percentage point. Asquith, Mast, and Reed (2023) study the effects of large apartment building developments on nearby rents, finding that a 40% increase in supply reduces rents by 6%, though these effects decay rapidly with distance. A similar sharp spatial decay is documented by Anenberg and Kung (2014) in the context of supply shocks from foreclosures. Our estimated effects are smaller than those in Asquith, Mast, and Reed (2023), but they operate over much larger geographic areas, highlighting how large-scale development can substantially influence broader housing markets

As mentioned above, the effects are highly heterogeneous depending on the characteristics of the exposed neighborhoods. Point estimates are about 50% larger in non-VINEX neighborhoods with above-median incomes within their municipality, and statistically insignificant for below-median income areas. Since movers into VINEX properties were disproportionately high-income, we interpret this pattern as evidence that VINEX neighborhoods primarily competed with affluent pre-existing neighborhoods. Consistent with this, migration data show that high-income non-VINEX neighborhoods exposed to VINEX did not lose population, but still experienced lower inflows and outflows relative to other neighborhoods in the same metropolitan area.

We then show that the VINEX program had substantial direct and indirect effects on the spatial distribution of jobs across the Netherlands. Mechanically, the creation of new housing supply generated a large increase in local employment within VINEX neighborhoods,

[6]In the Appendix, we also present estimates in which we replace the dummy for high VINEX exposure with a continuous measure of the share of VINEX land within 5-Km of a neighborhood. Results are robust to using this alternative specification.

concentrated in service sectors. In addition, in highly exposed non-VINEX neighborhoods, employment growth was 11.2 percentage points higher than in other neighborhoods. Strong job growth was driven primarily by Non-Tradable Services sectors. For these sectors, jobs in highly exposed neighborhoods increased by nearly 25% more than in the rest of the country. This pattern is consistent with the fact that individuals moving to VINEX neighborhoods were highly likely to work in Tradable Services. This, in turn, may have stimulated the relocation of workplaces for these high-paying jobs in the surrounding areas.

To the extent that the local pooling of workers with similar skills can lead to agglomeration economies (Henry G. Overman, 2010, Gaubert et al., 2021, Moretti, 2021), the labor market effects, combined with the results showing that VINEX mainly attracted high-income movers, highlight that the program may have suggest that the program substantially stimulated local economies, but also likely contributed to rising inequality within cities.

As mentioned above, our paper contributes to the literature on the effects of new housing supply on local housing and labor markets, providing novel evidence on the broad effects of a large housing development program. It also contributes to a large literature in financial economics studying the determinants of house price fluctuations and, in particular, the relative importance of supply and demand side drivers.[7]

Moreover, our findings are also related to the literature that studies urban migration. Most recently, Boustan (2010) and Derenoncourt (2022) study white "flight" to suburbs and subsequent segregation using the indirect effects of African-American migration in the 1950s. Howard (2020), Howard and Liebersohn (2021), and Schubert (2022) study the effects of internal U.S. migration flows on local employment, economic activity, and house price fluctuations.

The rest of the paper proceeds as follows. Section 2 discusses the institutional background of the VINEX program and the data used in our study. Section 3 studies the development of VINEX neighborhoods, documenting evidence of increases in housing supply, mobility, and changes in employment within VINEX areas. Section 4 focuses on measuring the effects of the VINEX program on pre-existing neighborhoods. Section 5 contains our concluding remarks.

[7]See, for example, Bayer, Magnum, and Roberts (2021), Favilukis, Ludvigson, and Van Nieuwerburgh (2017), Favilukis and Van Nieuwerburgh (2021), and Chorodow-Reich, Guren, and McQuade (2024).

2 Institutional Background and Data

2.1 Urban Planning in the Netherlands and the VINEX Program

Like most of Western Europe and the United States, the Netherlands dealt with a large wave of suburbanization from the 1960s onward. However, the Dutch approach to suburbanization was different; rather than leading to uncontrolled sprawl, the Netherlands built up an international reputation as a "planners paradise" in the post-war period (Faludi and Van der Valk, 1994; Van der Wouden, 2015). The Dutch government would centrally plan what needed to be built and where, with implementation generally left to local authorities.

Until the early 2000s, the most important planning decisions were based on a "spatial planning memorandum" (*nota ruimtelijke ordening*) that would be released every 10 to 20 years and guide urban development in the coming period. In these memorandums, the Dutch government would lay out its vision for urban planning and designate actual areas for development. The VINEX policy was part of the "fourth memorandum." Before the VINEX program, Dutch planning dictated that new developments primarily had to take place in newly developed cities close to but distinct from the major Dutch cities, and not expand the pre-existing urban areas.

The VINEX Memorandum, established in 1991 and implemented during the late 1990s and 2000s, designated large new areas of land for residential development on the edges of existing major cities rather than in satellite cities. In total, approximately half a million properties were designated to be built in these areas, which was equivalent to 8% of the Dutch housing stock at the time of the initial release of the policy.[8] Although top-down programs are also present in other nations, none had the scale of the VINEX program and did not encompass all the main urban areas of the country in the same time frame (van der Krabben and Jacobs, 2013).

To determine the number of properties that needed to be constructed, the government annually computes a "statistical housing shortage." This is roughly a measure of the local number of cohabiting households above age 25 minus immediately available vacant properties.[9]

While these figures determine the number of properties to be constructed, they do not specifically take into account economic factors such as local house prices, nor do they inform where housing should be built within the region. As a result, Dutch construction does not

[8]Although generally associated with large-scale new development, the VINEX program also allowed for within-city redevelopment projects. These are excluded from these numbers, and we do not study them in this paper.

[9]For current measures, see "Het statistisch woningtekort nader uitgelegd". The definitions have changed over time.

necessarily take place in areas where it is economically most viable. Previous research shows that it is highly price inelastic (e.g. de Groot et al., 2010), a finding that we confirm in our data in the following sections.

For what concers VINEX, development locations were negotiated between the central government and the housing regions in local VINEX covenants, taking into account existing planning restrictions defined by the state and provinces in other land use plans. While municipalities, which decide on zoning, had to implement these plans, the top-down approach of the program implied that local residents could not exert strong influence on the location where housing was to be built. While local residents could in principle appeal changes in zoning and sometimes did so (e.g. Ruimtelijk Planbureau, 2006), they were unable to prevent VINEX neighborhoods from being built.

To illustrate this, Figure A.1 plots two maps from the Netherlands Environmental Assessment Agency that show the housing region of the Hague, with land use definitions as as of 2015 (top panel) and zoning restrictions for housing (bottom panel). In the top panel, red to purple shades indicate built-up areas used for housing (red) or building and transportation (purple), yellow shades semi-built-up areas (mostly greenhouse agriculture), and green shades areas for nature and leisure (e.g., forest, sports clubs). Areas that changed land use in the VINEX period between 1996 and 2015 are shaded in darker colors, with arrows pointing to specific VINEX developments. The bottom panel overlays the same map with areas with planning restrictions on housing, which can be indicated from light restrictions (yellow) to very strong restrictions (dark red) that make new development extremely difficult.

The key takeaway is that VINEX areas were built in areas close to major cities that consisted of agricultural land that was not yet built-up and for which no strong planning restrictions existed at the provincial or national level.[10]

2.2 Data

Our analysis focuses on the Randstad, which is the urbanized western region of the Netherlands, and the most populous and economically important area of the country. It is home to more than half of the Dutch population and consists of the metropolitan areas of Amsterdam, Rotterdam, The Hague, and Utrecht, and the surrounding cities. For this area, we construct

[10]These restrictions also imply that large differences exist across cities. For example, while most VINEX areas in The Hague were close to the main city, the Amsterdam urban areas built most of their VINEX properties in Almere, a city 30 kilometers away from the Amsterdam city center, as most of the area immediately surrounding the city was protected. As a result, the VINEX development *Leidsche Rijn* in Utrecht, the fourth-largest city in the country, was as close to the center of Amsterdam as the VINEX developments in Almere.

five datasets that allow us to comprehensively study the effects of the VINEX program.

First, we use a digital copy of the VINEX Atlas (Boeijenga and Mensink, 2008) to identify which buurts were part of the VINEX program, and to map them into the 2022 buurt geographies defined by Statistics Netherlands. Even though many VINEX areas were already designated in the initial 1991 memorandum of the policy, the exact locations were negotiated between the central government and the housing regions in local VINEX covenants.

We designate a buurt as part of the VINEX program if it had VINEX construction after 1995, if it was designated as an outlying site for development in the VINEX covenants listed by (Boeijenga and Mensink, 2008), and if VINEX properties ultimately represented 50 percent or more of the properties in the buurt. Figure 1 shows the location of VINEX buurts in the Randstad. Importantly, all major outlying sites in the Randstad area were successfully developed, implying our sample does not face survivorship bias.[11]

Second, we track housing supply with data on the universe of the Dutch housing stock from the Basisregistratie Adressen en Gebouwen (BAG). For every individual housing unit in the Netherlands, this dataset contains information about the address of the property, the number of square meters, and the building year. Using the location data, we map all properties to their 2022 neighborhoods using the *buurt* neighborhood definition of Statistics Netherlands. We track new construction based on the building year of properties from 1984 onward.[12] Panel A of Table 1 displays summary statistics by buurt and year.

Third, to estimate house price effects, we use transaction-level data from the Dutch Association of Realtors, a network of real estate brokers that covers about 70% of transactions in the Netherlands. The data span the years 1991 to 2015. For every transaction, we observe the address, property characteristics, sales price and listing prices, and the closing date. Panel B of Table 1 reports summary statistics for this dataset.

Fourth, to study the effects of VINEX supply on the spatial distribution of jobs, we use detailed data on all jobs and job locations from Stichting LISA, which is the Dutch employment register. These data cover the period from 1996 to 2015. Panel C of Table 1 reports summary statistics by buurt and year.

Fifth, we use administrative data from the residential registration, property, and employment datasets made available by Statistics Netherlands. The data include the residence addresses and birth years for the entire Dutch population from 1995 to 2015. For working

[11]Some VINEX neighborhoods in the lower-cost, outer parts of the Netherlands were not entirely realized due to a lack of demand, implying VINEX exposure is endogenous to prices in these areas. Our data does not cover these areas.

[12]The data do not track properties that have been built after 1984 but have been demolished before 2022. However, such demolitions are extremely rare.

residents, we can link to the wage earned by each resident and the sector in which they are employed. Wages and sectors are available through administrative data from 1999 to 2015, and based on a survey covering between a third to half of the working population from 1995 to 1998. Panel D of Table 1 reports some key summary statistics by buurt and year for demographics, mobility, and occupation. Missing observations are because Statistics Netherlands censors buurt-level statistics on certain characteristics if the number of residents with those characteristics (for example, moved in during the past year, or working in Tradable Services) is below 10. This has only marginal effects on our analysis, since the population of buurts typically ranges from hundreds to thousands of individuals, as shown in the table. We link to this dataset the characteristics of the primary residence of each individual over time using data from the Woonbase, which includes basic characteristics such as building year, square meters, building type, and tax value for all properties in the Netherlands.[13]. For the entire sample of movers between 1995 and 2015, we compute the distance (as the crow flies) between the current and previous residence.

3 The Growth of VINEX Neighborhoods

3.1 Housing Supply

We begin by documenting the timing and magnitude of the housing supply shock generated by the VINEX policy. As mentioned in the previous section, for our results, we focus on the city of Almere and the Randstad, which comprises the metropolitan areas of Amsterdam, Rotterdam, The Hague, and Utrecht. The rationale for adding Almere to the sample is that this is the location in which most of the VINEX neighborhoods for the metropolitan area of Amsterdam were allocated, and that Almere is, in general, close to Amsterdam and the rest of the Randstad.

Panel A of Figure 2 plots, for each year between 1984 and 2015, the average number of new units developed per neighborhood (Dutch: '*buurt*'), separately for VINEX and non-VINEX areas. VINEX areas had little new construction until 1993. In this first period, new development is concentrated in the non-VINEX buurts. This is reasonable since at this point, VINEX areas are either residential neighborhoods in rural areas or farmland. However, by 1996, VINEX buurts had almost twice the number of newly developed units as the average non-VINEX neighborhood. VINEX construction peaks in the early 2000s, when the average construction volume is 7-8 times the construction volume in non-VINEX areas.

[13]Properties demolished between 1995 and 2014 are not included in the Woonbase

To test this effect more formally, we estimate the following regression equation:

$$y_{b,t} = \sum_{t=1984}^{2015} \gamma_{t,VINEX} \left(I_t \times I_{VINEX} \right) + a_b + a_{muni,t} + e_{b,t}, \tag{1}$$

where $y_{b,t}$ is a variable capturing new construction in Buurt b and year t; I_t and I_{VINEX} are dummies equal to one in year t and in VINEX Buurts, respectively, a_b is a Buurt fixed effect and $a_{muni,t}$ is a municipality (gemeente) by year fixed effect. The coefficients of interest are $\gamma_{t,VINEX}$, which estimate each year the average gap in new construction between VINEX and non-VINEX Buurts. Panel B of Figure 2 reports our estimates when $y_{b,t}$ is set equal to the number of new units developed in buurt b and year t. We omit the 1994 coefficient, so that point estimates capture relative differences with respect to the 1994 gap between VINEX and non-VINEX buurts. Formally, the VINEX memorandum was released in 1991, but it took several years for public authorities to finalize the identification of potential VINEX sites and the related land allocation. Hence, the 'main' VINEX period is typically designated as 1995-2005, with realization completed in the 10 years after. We therefore draw a vertical red line splitting the sample into the period before and after 1995 (before and after the main implementation of the VINEX program).

In the first part of the sample, point estimates of the gap between VINEX and non-VINEX buurts are negative. As the VINEX program is implemented, point estimates jump upward. In 2000, VINEX buurts developed on average 60 more units than non-VINEX buurts per year. The gap then shrinks starting in 2005, and converges to close to zero in 2014-2015.

Table A.1 in the Appendix reports estimates from a diff-in-diff design in which the reply the year-VINEX interaction coefficients $\gamma_{t,VINEX}$ with a single interaction between the VINEX dummy and a dummy equal to one for the years after 1995. The dependent variables are the number of units developed, the space developed, and the space per new unit developed.

We find that after 1995, VINEX buurts developed, on average per year, 52 more units, 4,300 more square meters of space, and developed units that are on average 20 square meters larger. The fact that new VINEX properties are larger than new properties developed in the rest of the country is consistent with the nature of the program, which is to develop market-rate suburban housing for families.

However, this also implies that VINEX homes, like suburban properties in other nations, are not accessible for lower-income households, as we show in the following sections.

3.2 Moving Chains

We then turn to the effects of the VINEX program on mobility. Our goal is to provide evidence on the inflow of individuals moving into the VINEX buurts, and on the characteristics of these individuals. Moreover, thanks to the richness of our data, we can explore the characteristics of individuals who moved into properties vacated by VINEX movers.

Our findings indicate that VINEX created an opportunity for households with relatively high incomes to increase housing consumption and transition to homeownership. These households were replaced in their neighborhoods of origin by lower-income and younger individuals.

First, we use data on address registration from Statistics Netherlands to track population flows in and out of individual buurts from 1995 to 2015. We calculate $m_{in,b,t} = NMov_{in,b,t}/Pop_{b,t}$, which is the ratio of the number of individuals who move into a buurt b in year t ($NMov_{b,in,t}$) over the total population of the buurt in that year ($Pop_{b,t}$). In addition, we calculate the $m_{in-out,b,t} = (NMov_{in,b,t} - NMov_{out,b,t+1})/Pop_{b,t}$, in which the numerator is the difference between the number of individuals who move in a buurt in year t ($NMov_{b,in,t}$) and the number of individuals who move out in the following year ($NMov_{out,b,t+1}$). The variable m_{in} captures the population inflow relative to the number of local residents, while the variable m_{in-out} captures population trends.[14]

Table A.2 in the Appendix displays estimates from regressions of m_{in} and m_{in-out} on a dummy equal to one for VINEX buurts, and municipality by year fixed effects. Over the full time period available from Statistics Netherlands (from 1995 to 2015), the estimated coefficient for the dummy is positive and statistically significant, and approximately equal to 0.1 for both m_{in} and m_{in-out}. This implies that move-in flow, and move-in flows net of following outflows are 10 percentage points higher in VINEX buurts compared to other buurts in the same municipality and year. This effect is quite large, considering that the mean of m_{in} is 11% and the mean of m_{in-out} is 0.9%. When the time period is restricted to the first decade of implementation of the program (from 1995 to 2005), the coefficient on the VINEX dummy is even larger, with point estimates of 19 percentage points for m_{in} and 17.5 percentage points for m_{in-out}. Thus, VINEX buurts have experienced substantial population growth, one order of magnitude larger than in the rest of the country, and especially pronounced in the first decade of the program.

Using the data from Statistics Netherlands, we can then dig deeper into the characteristics of VINEX movers, of the individuals who replace them in the vacated properties, of the

[14]We winsorize both variables at the top 0.5 percentile, since the distribution is highly skewed due to the presence of neighborhoods with low population experiencing new real estate development.

movers who take over the properties vacated by the second group, and so on.[15]

We define as "first-round movers" those moving to a VINEX property when it gets occupied for the first time. We compute the total number of first-round movers, the median value of their newly-built VINEX properties, and the share of movers who are owner-occupiers (in the property they move to). We also calculate the average age of moving adult residents and the average full-time wage for movers who are working and of prime working age (25 to 65 years old). For these residents, we also compute the share of residents employed in tradable services based on industry codes (the mapping is displayed in Table A.7 in the Appendix.).

To determine the moving chain induced by the "first-round" VINEX moves, we first determine whether a first-round move was made with its entire original household moving to the VINEX property. If that is the case, we determine whether any other resident moved to the left-behind property within two years after the previous resident moved out. This gives us the "second-round movers", for which we compute property characteristics, owner-occupier status, and household income. We iterate the same procedure for subsequent round movers.

Panel (a) of Figure 3 shows the total number of movers in each round induced by VINEX construction. Over 600,000 individuals move in the first round, becoming VINEX residents. These moves lead to a moving chain that involves a total of over 1.5 million individuals across six rounds of moves. This is about 10% of the total Dutch population in 1995, implying that VINEX led to a major reallocation of people across space.

Note that this estimate is conservative, since as we iterate over rounds in the moving chain, it becomes increasingly challenging to accurately track movers, and many chains end up breaking. Some moving chains end just because the mover is leaving a household, and the remaining household members remain at the original address. This is the case, for example, when there is a divorce or when an individual moves out of his parents' home.

However, there are also situations in which the moving chain breaks due to data limitations. In some cases, there is a gap of years between the move-out date of an occupant and the move-in date of a new occupant. This could be because of data inaccuracies (due, for example, to administrative changes in addresses), because the house underwent substantial remodeling, or because the house actually remained vacant for several years. Since we cannot evaluate these cases, we omit them from our calculations, which leads to broken moving chains. Finally, some addresses coincide with multiple housing units. In this case, it is not always possible to

[15]To track moves, after we observe the first residential registration on a new property, we define all movers that move within 90 days to the same property as part of the same household. The reason is that moves often coincide with the formation of new households, and individuals who form a new household may not move on the same date.

identify subsequent movers.

Panel (b) of Figure 3 tracks the median value of the move-in destination properties in each round. It shows that VINEX properties receiving first-round movers are substantially more expensive than origin properties and all properties involved in other moving rounds. The gap is substantial, with the median VINEX property being almost 40% more expensive. On average, VINEX properties are also 20-25 square meters larger than properties involved in the following rounds.

Panel (c) shows the share of owner-occupied move-in properties for each round. The share of owner-occupied properties is above 70% for VINEX properties in the first round. It is only 50% for the properties involved in the second round, and drops below 40% for the following rounds. The home-ownership rate in the Netherlands stood at 48% at the start of the VINEX program. Thus, households moving to VINEX were more likely than movers down the chain to transition from the rental to the ownership market. Some of this reflects a different position in the life-cycle. Panel (d) shows that first-round movers are on average older than movers in the second round (39 compared to 36 years old), with the age gap increasing as we go down the moving chain.

Finally, there are significant differences in the wages of working residents who move to VINEX buurts. Panel (e) shows the average full-time wage across movers. Workers moving to VINEX properties have significantly higher wages compared to workers in later rounds, with a difference of about 28% from round one to round six. For a small subset of households included in the income survey, we can also observe household income. On average, the median households in the first round have income at the 71st percentile, which reduces to the 41st percentile by round six. These differences are too large to be merely accounted for by the fact that individuals moving to VINEX buurts are 3-4 years older than those who take part in the following rounds of the moving chain. Indeed, panel (f) also shows that the composition of jobs for individuals involved in the first round of moves (moving into VINEX buurts) is different. In the first round of the moving chain, 32% of individuals are employed in Tradable Services. The share drops sharply to 27% in the second round, and further declines in the following rounds, falling below 24% in round six. As we discuss in the next section, jobs in sectors that are classified as Tradable Services on average earned substantially higher wages than sectors in Non-Tradable Services and Agriculture and Manufacturing. Combined, the evidence in panels (e) and (f) suggests that individuals moving to VINEX properties are likely to be high earners compared to the rest of the Dutch population.

Overall, the results show that individuals moving to VINEX had relatively high income, transitioned into more expensive and larger homes, and had a relatively high likelihood of becoming homeowners in this transition. These movers were replaced by younger, lower-

income households, who do not have an above-average likelihood of becoming homeowners with their move.

3.3 Labor Market

We conclude this section by exploring the effect of job composition in VINEX buurts. The large increase in housing supply and high-income population clearly created local demand for goods and services, as well as sites for new business activities.

We document the labor response using the data from LISA described in Section 2.2. This dataset covers the geo-location of individual jobs and related business category codes,[16] across the Randstad and in each year from 1996 to 2015. While we do not have access to this information in the period before the implementation of the VINEX program, it is reasonable to expect that the creation of new jobs based in VINEX buurts will start materializing only a few years after the beginning of the program, especially since VINEX construction activity really takes off only after 1998 and peaks around year 2000 (see Figure 2).

The dataset provides great details on the specific sector allocation of each job. For our analysis, we assign 2008 SBI level 2 codes (corresponding to broad industries, such as mining or education) to NACE Eurostat sectors, and then map sectors into the macro-categories of Manufacturing and Agriculture, Non-Tradable Services, and Tradable Services. The detailed mapping is displayed in Table A.7 in the Appendix.

Our goal is to identify broad categories that differ in terms of lifetime income and career prospects, with the jobs with the strongest prospects generally belonging to occupations in Tradable Services. Appendix Figure A.2 displays the evolution from 1996 to 2015 of the mean wage for Manufacturing and Agriculture, Non-Tradable Services, and Tradable Services. Over the entire sample period, Tradable Services received the highest wages, approximately 30-40% higher than Non-Tradable Services, and 15-20% higher than Agriculture or Manufacturing.

Figure 4 displays the average number of jobs across buurts from 1996 and 2016, for Manufacturing or Agriculture, Non-Tradable Services, and Tradable Services, and separately for VINEX buurts and non-VINEX buurts. As we would expect, across all categories, VINEX growth outpaces the rest of the Randstad. However, differences across macro-categories are relevant.

Panel (a) focused on manufacturing and agriculture jobs. For this category, the average number of jobs across non-VINEX buurts fluctuates between 50 and 60 jobs over the entire period. For VINEX buurts, the number of jobs is approximately 5, grows to slightly above

[16] Business category codes are based on the SBI (Standaard Bedrijfsindeling) used in the Netherlands.

20 by 2011, and remains stable thereafter as VINEX construction volume decreases.

Panel (b) shows evidence for Non-Tradable Services. In these areas, the average number of jobs grows in non-VINEX buurts from approximately 320 to 420 (31% growth). In VINEX buurts, the growth is from 4 to 300 jobs.

Finally, panel (c) shows results for Tradable Services. Non-VINEX average jobs grow from 150 to 200 (33% growth). For VINEX, Tradable Services jobs grow from close to zero to approximately 170.

Overall, we can infer from this evidence that, even after being fully developed, on average, VINEX buurts host a smaller number of jobs than other buurts in the Randstad. This is consistent with the suburban nature of these neighborhoods.

Combined, the figures highlight how the VINEX development program led not only to a massive re-allocation of people, but also to the reallocation and creation of jobs. VINEX buurts have experienced much faster job growth than the rest of the country. The total mean number of jobs across categories in non-VINEX buurts grows from 1996 to 2015 by approximately 30% (from 530 to 680). The mean number of jobs in VINEX buurts grows by more than 9 times.

Moreover, the composition of jobs in VINEX buurts is slightly different from that in other areas. A VINEX buurt on average hosts 67% fewer manufacturing or agriculture jobs. However, it hosts only 30% fewer Non-Tradable Services jobs, and 15% fewer Tradable Services jobs. This highlights that job creation is tilted toward services, in particular, the "higher prospects" Tradable Services category.

Using the administrative data from Statistics Netherlands, we can also track the sectoral composition of employment for local *residents*. In Figure 5, we display the time series of the mean share of residents employed in each macro-category (out of all employed residents), from 1999 to 2015, and separately for VINEX and non-VINEX buurts.[17]

The share of residents employed in Agriculture and Manufacturing decreases over time, across all buurts, but is substantially higher in non-VINEX buurts. For instance, in the early 2000s, the share is 11-12% for non-VINEX buurts and below 10% for VINEX. The majority of residents is employed in Non-Tradable Services, both in VINEX and non-VINEX buurts, and the share increases over time, approaching 65% in 2015. However, until the 2010s, the share was systematically lower for VINEX buurts, with a gap of 1-1.5 percentage points with

[17]Statistics Netherlands censors the data when the number of individuals employed in a specific macro-category in a certain buurt and year is below 10. We fill in the missing data by estimating a kernel density function on the available observations and splicing in a smooth extension on the missing mass of observations. We randomly draw the missing values from the spliced distribution. This issue mainly affects workers in Agriculture and Manufacturing. Results are similar if we generate the figures using censored data.

respect to non-VINEX buurts. Finally, a larger share of residents is employed in Tradable Services in VINEX buurts. The share of residents employed in Tradables declines in both VINEX and non-VINEX buurts in the 2010s. However, until 2010, approximately 30% of employed VINEX residents worked in Tradables, while only 27% of non-VINEX residents worked in the same sectors.

Overall, we find that VINEX buurts experienced the strongest job growth in services, in particular in sectors belonging to Tradable Services, which are the highest paid. We also find that the share of local residents working in Tradable services is systematically higher in VINEX compared to non-VINEX. The findings reversed for Agriculture and Manufacturing. These sectors realize the smallest amount of job creation, and employ a smaller share of local residents in VINEX compared to non-VINEX buurts.

Overall, this points to the fact that VINEX development is associated with the proliferation of local highly paid jobs. This can be because some of the high-income individuals moving to VINEX (see Section 3.2) are able to move their job to the VINEX areas, or because some high-value services, such as legal or finance, open offices in VINEX buurts to serve the local residents.

4 Effects of VINEX on Nearby Neighborhoods

The previous sections show that the VINEX program led to a significant increase in housing supply, with the construction of a large number of relatively large and high-value homes compared to other neighborhoods. This resulted in the relocation of households and jobs to the VINEX neighborhoods.

That VINEX construction led to more jobs and housing in these areas follows by definition. The more interesting question is how this shock affects local housing and labor markets. In this section, we study the effects of this large market-rate housing supply shock beyond the borders of the areas included in the program. We look at non-VINEX neighborhoods across Randstad and estimate indirect effects on house prices, migration, and jobs.

4.1 Measuring Exposure to VINEX Neighborhoods

The purpose of our analysis is to study the effect of VINEX on the housing and labor market situation in nearby non-VINEX neighborhoods. Identifying the causal effects of the program on non-VINEX neighborhoods presents several challenges.

First, the VINEX policy affects all metropolitan areas in the Netherlands at the same

time. Thus, there is no clear control group in the country. Second, the timing of development for the individual VINEX land areas is endogenous to local demand, such that high-demand areas might see more and earlier development compared to low-demand VINEX areas.

We address these concerns in two ways. First, we exploit micro-location-level variation in proximity to VINEX buurts. We choose to focus on non-VINEX buurts that have higher "exposure" to VINEX development within a 5-Km radius. We focus on these localized effects because the new VINEX supply is likely to affect surrounding pre-existing neighborhoods by both attracting households currently living in these neighborhoods, who are aiming to upgrade their housing consumption, and by competing against the neighborhoods for new demand from households that are engaging in longer-range moves. Moreover, by driving the relocation of people, VINEX is likely to change the composition of local employment across sectors, and may lead to the relocation of businesses.

The 5-Km radius captures local mobility effects, as well as local competition between neighborhoods, and potential local business creation. In terms of local mobility, between 1995 and 2015, approximately 75% of individuals moving to a new buurts are vacating a home that has distance of less than 5 km away from the new residence. While VINEX buurts have a larger share of long-range moves, still more than 50% of individuals moving to VINEX vacated a residence that was within a 5-Km radius.

Second, we construct the measure of exposure using the share of surrounding land occupied by the VINEX neighborhoods post-1995, instead of the share of actually developed VINEX units, which likely is not entirely exogenous to demand. A neighborhood surrounded by a larger share of VINEX land is more exposed to new VINEX supply. Land assignments to the VINEX program were not decided in response to local excess demand at the neighborhood level, but rather by central assignment at the national level based on "housing shortages" at the regional level. We provide empirical support to this anecdotal evidence in Table 2, which we discuss below.

In the data, for each buurt i not included in the VINEX program, we calculate $ShareVINEX_{5km,i}$, which is the share of land, within a 5-Km radius of the center of buurt i, occupied by buurts in the VINEX program post-1995.

The left panel of Figure 6 shows the distribution of $ShareVINEX_{5km,i}$ across 5,118 buurts in the Randstad. The distribution is highly skewed, the mean is just 2.1%, but the top 10% of buurts by exposure have values exceeding 6.9%, and the bottom 47% of buurts have a value of 0. The right panel of the figure shows that there are substantial differences at the municipality (gemeente) level, plotting the 75th percentile of the distribution of $ShareVINEX_{5km,i}$ across 124 municipalities in the Randstad. For more than half of these municipalities, the 75th

percentile is equal to zero. However, there are several municipalities in which the top quartile of buurts have exposures exceeding 10%.

Thus, to capture relevant micro-location-level variation in exposure, we define a dummy $I_{HighVINEX,i}$, which equals one for values of $ShareVINEX_{5km,i}$ that are in the top quartile within their municipality. We use $I_{HighVINEX,i}$ to identify non-VINEX buurts that were highly exposed to VINEX spillovers.

To corroborate that VINEX exposure does not mechanically reflect pre-program excess demand, Table 2 reports estimates from various specifications in which, for the sample of non-VINEX buurts, we regress buurt-level log price growth between 1991 and 1995 and VINEX exposure based on post-1995 land assignments. We measure VINEX exposure both as the share of VINEX land within a 5-Km radius ($ShareVINEX_{5km,i}$) and as a dummy equal to one for buurts with exposure in the top quartile within the municipality ($I_{HighVINEX,i}$). When we exclude and include the municipality fixed effects, we find insignificant and economically negligible coefficients.

Figure 7 displays on a map of the Randstad the locations of VINEX buurts (in blue), and the locations of non-VINEX buurts with exposure in the top quartile of their municipality ($I_{HighVINEX} = 1$, in red). The municipal boundaries are colored black. While it is clear that our measure of exposure uses micro-location variation within a municipality, it is also apparent that there is within-municipality spatial autocorrelation among the high-exposure buurts. To address this issue, the regression specifications in the following sections double-cluster standard errors by municipality and year.

4.2 Difference-in-Differences Design

We estimate the spillover effects of VINEX supply on various outcomes in pre-existing neighborhoods using the following regression equation:

$$Y_{i,\tau} = \sum_{\tau=1991}^{2015} d_{\tau,HighV} \left(I_{\tau,i} \times I_{HighVINEX,i} \right) + B\boldsymbol{X}_i + a_b + a_{muni,\tau} + v_{i,\tau} \tag{2}$$

where $Y_{i,\tau}$ is the outcome of interest for unit i in year τ, $I_{\tau,i}$ is a dummy equal to one for unit i and year τ, and $I_{HighVINEX,i}$ is a dummy for high VINEX exposure. This indicator variable is always defined at the buurt level, and is equal to one for buurts with the share of land belonging to VINEX buurts within a 5-Km in the top quartile in their municipality (see Section 4.1). The specification includes controls for the characteristics of unit i (the vector $\boldsymbol{X}_i'$), time-invariant characteristics of the buurt in which i is located (fixed effects a_b), and municipality-level time fluctuations (fixed effects $a_{muni,\tau}$).

This specification assumes that units with values of the indicator variable $I_{HighVINEX,i}$ equal to one have the highest exposure to spillovers from VINEX supply, and can be considered treated, while the other buurts can be regarded as controls. However, other buurts likely also receive spillovers from VINEX buurts, just to a lesser degree.

Thus, we estimate the specifications based on equation (2) on two samples. First, the sample of all observations in non-VINEX buurts in the Randstad. This sample includes as controls all units in buurts that do not have exposure in the top quartile in their municipality. In this case, the control group is more likely to be similar to the treated buurts.

Second, the sample of observations in non-VINEX buurts that are either in the top quartile of exposure in their municipality, or that have zero exposure (no buurt VINEX land within a 5-Km radius). In this case, the control group includes only non-VINEX buurts that are unlikely to receive direct spillovers from the VINEX supply. The concern with this subsample is that buurts with zero exposure to VINEX may be systematically selected.

We show that our empirical estimates are similar across these alternative samples, which implies that our findings are robust to different choices of the control group.

Along with the event study specification presented above, we also estimate a more compact difference-in-differences specification:

$$Y_{i,\tau} = d_{VINEX} \left(I_{HighVINEX,i} \times I_{post,i,\tau} \right) + AX_i + a_b + a_{muni,t} + e_{i,t} \tag{3}$$

where the variables have the same interpretations discussed above, and $I_{post,i,\tau}$ is a dummy equal to one in the post-VINEX implementation period, which consists of the years from 1995 to 2015. Our focus in this specification is the interaction coefficient d_{VINEX}.

Finally, we report in the appendix estimates from an alternative specification of equation (3) in which we replace the dummy for high-VINEX exposure with $ShareVINEX_i$, which measures the share of VINEX land within a 5-Km radius of the buurt of observation i. We show that our results are robust to using this continuous variable to capture exposure.

4.3 Price Effects

We estimate spillover effects from the new VINEX supply on house prices, using the difference-in-differences specification in equation (2). In this case, the dependent variable is the log sales price of an individual property i in year τ, and the vector of controls for i includes the log volume (in cubic meters) of the property, dummies for properties that underwent indoor and outdoor remodeling after construction, dummies for the number of rooms, and property

type. In addition to buurt and municipality by year of sale fixed effects, the specification also includes year built by year of sale fixed effects.

Our prior is that increases in local supply shall result in decreases in house prices. However, the magnitude and heterogeneity of these effects are of crucial interest to the literature.

Figure 8 displays the point estimates and 95% confidence intervals for the coefficients d_τ, for years 1991 to 2015. The omitted interaction is 1994, which is the year before final land assignments and construction projects for the program took off. A vertical dotted red line splits the sample into pre-final land assignment (years 1991 to 1993) and post-final land assignment (1995 to 2015). Panel (a) reports results based on all non-VINEX buurts in the Randstad, while panel (b) restricts the sample to buurts with either high exposure to VINEX ($I_{HighVINEX} = 1$) or zero exposure (no VINEX buurts land within a 5-Km radius). In both samples, there is no evidence of pre-trends before 1994, while house sales prices in high-exposure buurts start lagging behind those of other buurts in 1997. Estimates of d_τ reach a value of -2% in 1999, and fluctuate around this threshold for the remainder of the sample period.

Thus, the results suggest that the VINEX policy did moderate house price growth and led to lower house prices in areas highly exposed to new VINEX supply. On average, neighborhoods with high exposure to VINEX areas saw house prices decline by 4% relative to areas with almost no exposure to VINEX areas.

Figure 9 studies the heterogeneity in the price effects. Specifically, we focus on heterogeneity based on buurt income. Lower prices are likely to be driven by residents' outflow from non-VINEX buurts to the new VINEX supply. However, as discussed in Section 3.1, VINEX supply consists of large homes, likely unaffordable for lower-income households.

We estimate the following regression specification:

$$\begin{aligned} log(p_{i,\tau}) = & \sum_{\tau=1991}^{2015} f_\tau(I_{HighVINEX,i} \times I_\tau \times I_{HighInc}) + \\ & + \sum_{\tau=1991}^{2015} g_\tau(I_{HighVINEX,i} \times I_\tau \times I_{LowInc}) + \\ & + BX_i + a_b + a_{muni,\tau,HighInc} + \epsilon_{i,\tau}, \end{aligned} \tag{4}$$

where $log(p_{i,\tau})$ is the log of the sales price of property i at time τ, $I_{HighInc}$ (I_{LowInc}) is a dummy for buurts that have income greater or equal (smaller) than the median in the municipality, $a_{muni,\tau,HighInc}$ are municipality by year fixed effects interacted with $I_{HighInc}$, while all other variables are the same as in the baseline difference-in-differences specification.

Estimates of the coefficients f_τ and g_τ are displayed both for the full sample and the

restricted sample of buurts with high and zero exposure. It appears clearly that the price effects of VINEX supply are starker for above median income buurts (panels a and c of Figure 4), with prices lagging by 5% by the year 2000. The effects are instead muted and largely not statistically significant for below median income buurts (panels b and d), with averages of only 1% to 2 %.

To summarize the effects of VINEX supply on prices, we estimate the compact difference-in-differences specification in equation (3). Table 3 reports our results. Panel A displays full sample estimates, and panel B displays estimates for a sample restricted to high and zero exposure buurts.

In column (1), the set of controls is restricted only to log gross volume, buurt fixed effects, and metropolitan areas by year fixed effects. Column (2) displays estimates when including the full set of controls. Column (3) restricts the sample to buurts with income greater than or equal to the median in their municipality, and column (4) restricts the sample to buurts with income below the median. Finally, column (5) displays the results for a specification analogous to equation (4), with triple-interaction effects with a dummy equal to one for buurts with income above the median in their county. The triple-interaction coefficient $g_{VINEX,H}$ captures the incremental price effects for high-income buurts.

We find results that are consistent with the estimates displayed in the figures. After the implementation of the VINEX development program, prices are on average 2.6% lower in high VINEX exposure buurts. When the sample is restricted to above median income buurts, the effect of high VINEX exposure is approximately -4%, while the effect is smaller than 2% when the sample is restricted to low-income buurts. In column (5), the coefficient capturing the incremental effect of VINEX exposure for high-income buurts is statistically significant and equal to -3% in the full sample, and equal to -2% in the restricted sample.

Table A.3 estimates the same regression specification, over the full sample of VINEX buurts, but with an alternative measure of VINEX exposure. Instead of the dummy for high-exposure buurts, we use the share of VINEX land within 5-Km of the buurt. Consistent with the results in Table 3, we find a negative effect of a higher exposure to VINEX land on prices after the implementation of the VINEX policy. The effect is larger for above median income non-VINEX buurts and not statistically significant in below median income buurts.

We dig deeper into the price effects by using our settings to estimate inverse supply elasticities, which we define as the elasticity of local prices to the VINEX-driven supply shocks. Table 4 reports estimates of the regression equation:

$$\Delta log(S_{b,k}) = \gamma ExposureVINEX_{b,5Km} + g_{muni} + v_b \tag{5}$$

where $\Delta log(S_{b,k}) = log(S_{b,5Km,1996:2015}/S_{b,5Km,1984:1995})$, and $S_{b,5Km,1996:2015}$ is the number of new housing units completed within the 5-Km radius of non-VINEX buurt b after the beginning of VINEX construction (between 1996 and 2015), $S_{b,5Km,1984:1995}$ is the same measure but for the pre-VINEX period (between 1984 and 1995). The mean of $\Delta log(S_{b,k})$ across buurts in the Randstad is approximately 10pp. $ExposureVINEX_b$ is a measure of exposure to VINEX supply in the 5-Km radius, equal to either the share of land allocated to VINEX buurts, or the measure used in our diff-in-diffs test, a dummy equal to one for buurts with land shares in the top quartile of their municipality. The coefficient γ captures the effects of VINEX exposure on the change in new supply before and after the VINEX program. We find that estimates are highly statistically significant for both measures of exposure, and independent of whether we include municipality fixed effects or not. When the fixed effects are included, a 1pp increase in the share of VINEX land translates into a 6.7pp larger increase in new supply during the implementation of the VINEX program. Buurts with exposure in the top quartile of their municipality ($I_{HighVINEX} = 1$) see a 21pp larger increase in new supply than other buurts.

Given these results, we estimate the following Two-Stage-Least-Squares specification, in which we use the dummy $I_{HighVINEX}$ as an instrument for the effects of the increase in new construction on prices:

$$log(p_{i,t}) = \delta_S \widehat{\Big(\Delta log(S_{b(i),k}) \times I_{post,i,t}\Big)} + AX_i + a_b + a_{muni,t} + e_{i,t} \quad (6)$$

$$\Big(\Delta log(S_{b(i),k}) \times I_{post,i,t}\Big) = (I_{HighVINEX,i} \times I_{post,i,t}) + HX_i + h_b + h_{muni,t} + j_{i,t} \quad (7)$$

where $\Delta log(S_{b(i),k})$ is the change in log units built within a 5-Km radius of the centroid of the non-VINEX buurt in which property i is located, as in equation (5), while all other variables have the same interpetations as in the equations discuseed above. Equation (6) displays the second stage regression specification, while equation (7) displays the first stage.

The coefficient of interest is δ_S, which captures an instrumental variable estimate of the effect on sales prices of the VINEX-induced increase in supply taking place after 1994. Table 5 displays our estimates, in the full sample of non-VINEX buurts (panel A), and in the restricted sample of zero and high-exposure buurts (panel B).

For reference, column 1 shows OLS estimates of equation (6). We expect these estimates to be attenuated since supply naturally increases more in areas in which there are lower constraints to new construction, and thus in which price growth tends to be more moderate. The estimates both in the full and restricted sample are close to -0.03, which would imply that a 10% increase in new construction in the 5-Km radius results in only a 0.3% decrease in prices.

Column 2 reports the 2SLS estimates, which are of a similar order of magnitude but larger. We find that increases in supply instrumented with high exposure to the VINEX program have a coefficient close to -0.1 in the full sample. In columns 3 and 4, we split the data into above- and below-median income buurts. Consistent with our previous results, we find that the inverse elasticity results are driven by above-median-income neighborhoods. For these buurts, a 10% increase in supply from high VINEX exposure results in a 1.4% decrease in prices. In the low-income neighborhoods, the point estimate of the effect is 3 times smaller and not statistically significant. Results are similar in the restricted sample, even though the inverse elasticities are smaller. Approximately -0.053 when including both high and low-income buurts, and -0.083 in high-income buurts.

Table A.4 in the Appendix repeats the same analysis in the full sample using as an instrument the interaction between the post-implementation dummy and the share of VINEX land within 5-km of a non-VINEX buurt ($ShareVINEX$). The 2SLS estimates of the inverse elasticities are slightly smaller in magnitude, but comparable to those in panel A of Table 5.

These results provide further compelling evidence that new market-rate suburban housing has a significant localized impact on prices. However, these effects are highly segmented and depend on neighborhood characteristics. Price responses to market rate supply in nearby lower-income neighborhoods are weak or insignificant.

4.4 Mobility Effects

We use the data on address registrations from Statistics Netherlands to explore how VINEX development influenced residents' mobility in surrounding neighborhoods. As we discuss below, this helps shed light on the price effects described in the previous section. Specifically, we find clear evidence of strong flows of residents from high-exposure neighborhoods to VINEX. However, there is inconclusive evidence of whether these flows are different when comparing high exposure areas with high vs. low income. Rather, high income areas that have high VINEX exposure appear to experience a substantial decrease in overall mobility, or, in other words, lower turnover in their housing market. This drop in turnover, paired with the sharp increase in inventory in nearby VINEX neighborhoods, may suggest that new incoming residents might be substituting the high-income and high-exposure neighborhoods with VINEX, thus leading to sharper price drops.

Since the address registration data are not available before 1995, we cannot use a diff-in-diffs design similar to what was done for prices. Instead, we study how proximity to VINEX influenced moves in surrounding neighborhoods. We aggregate mobility information at the

buurt and year level, and we estimate the following specification:

$$m_{x,b,\tau} = M_{VINEX} I_{HighVINEX,b} + n_{muni,t} + v_{b,t}, \tag{8}$$

where $m_{x,b,\tau}$ is a measure of mobility into or out of buurt b, scaled by total population. $I_{HighVINEX}$ is, as in the previous sections, a dummy equal to one for buurts that have, within their municipality, high exposure to VINEX, and $n_{muni,\tau}$ is a municipality by year fixed effect.

First, we restrict the sample to the period between 1995 and 2005. This is the period in which the development of VINEX buurts was in full swing (see Figure 2), and population inflows to VINEX were highest (see Table A.2).

As in the previous section, the sample is also restricted to non-VINEX buurts. Moreover, we estimate the equation both on the full sample of non-VINEX buurts, and then on a restricted sample including only high and zero exposure buurts. We begin by discussing results for the full sample of non-VINEX buurts, in Panel A of Table 6.

We first estimate the regression equation (8), setting the dependent variable equal to the ratio of the number of individuals who moved from buurt b to a VINEX neighborhood over the total population of buurt b, $m^{VINEX}_{out,b,\tau}$. The sample is restricted to buurts that, by year τ, have had at least 10 individuals move to a VINEX.

The coefficient M_{VINEX} captures the difference between the share of VINEX movers between high exposure neighborhoods and other neighborhoods within the same municipality and the same year. Consistent with evidence discussed in Section 4.1 that Dutch residents are likely to make local moves, the estimated value of the coefficient is positive and highly statistically significant. The point estimate is 0.003, which means that the share of movers to VINEX is 0.3 percentage points higher in high-exposure buurts. This gap is economically significant, since the mean share of VINEX movers is 0.8 percentage points.

This larger outflow to VINEX buurts is consistent with VINEX generating an increase in for-sale inventory in the surrounding neighborhoods, which would then explain the price effects observed in the previous section.

We expand equation (8) by including an interaction term between the high VINEX exposure dummy and a dummy for buurt with income above the median in the municipality. We also include a richer set of fixed effects, with interactions among municipality, year, and the above median income dummy. Our goal is to test whether the high-exposure buurts with higher income, which experienced larger price drops, also experienced larger outflows to VINEX neighborhoods. While the interaction coefficient is positive and potentially economically meaningful, its estimate is highly noisy and not statistically significant.

We then set the dependent variable equal to the ratio of the difference between individuals moving in and out of a buurt, and the buurt population, $m_{in-out,b,\tau}$ (see Section 3.2). This variable measures whether moves in the buurt are not keeping up with outflows, and the buurt is losing population. We find no effects, either in the baseline specification of equation (8), or in the specification that includes the interaction term for high-income buurts. Thus, there is no evidence suggesting that buurts with higher exposure to the VINEX program are experiencing diverging population trends with respect to the rest of the country.

Finally, we set the dependent variable as the share of individuals moving into the buurt in a certain year $m_{in,b,\tau}$ (see Section 3.2). We do not find significant effects in the baseline specification, but when introducing the interaction term between high exposure and high income, we find that it is statistically significant, negative, and economically large. The point estimate is equal to -0.0143, which implies a lower share of individuals moving in, relative to lower-income buurts with the same exposure, of 1.4 percentage points. For reference, the mean share of individuals moving in a buurt per year during this period is 11%. Thus, this is a 13% drop in turnover compared to the exposed low-income neighborhoods, and after accounting for municipality-level trends that are common to all high-income neighborhoods (the regression includes municipality by year by income level fixed effects). This asymmetric drop in turnover appears consistent with the asymmetric price effects described in the previous section.

Panel B repeats the estimates for the restricted sample of buurts with high and zero exposure. The estimates are quantitatively close to those in Panel A. We find again significantly higher mobility to VINEX for high exposure buurts, no clear asymmetry in mobility to VINEX for high and low income neighborhoods, and a large drop in turnover for high income neighborhoods.

Table 7 repeats the same tests over the full sample from 1995 to 2015. Qualitatively, the results are similar, but the point estimates are smaller and, in some instances, noisier. Nonetheless, the full sample evidence aligns with the discussion for the 1995-2005 sample presented in Table 6. In the restricted sample, the test on the heterogeneity in move-in shares between high and low-income neighborhoods produces similar point estimates, but the results are noisier and not statistically significant.

Finally, Table A.5 in the Appendix repeats all the tests, replacing the dummy selecting high exposure buurts ($I_{HighVINEX}$) with the continuous measure of the land share within a 5-Km radius allocated to VINEX buurts ($ShareVINEX$). Qualitatively, the results align with those from the main specification.

4.5 Labor Market Effects

We now turn to the labor market effects of the VINEX program on the surrounding non-VINEX neighborhoods. We employ the same empirical strategy, which relies on differential exposure to VINEX land and aggregates information on local jobs at the buurt level. We estimate the following Poisson regression specification, using the LISA job location data:

$$NJobs_{b,\tau} = \exp\left(\sum_{\tau=1997:2015} g_\tau(I_{HighVINEX,i} \times I_\tau) + a_b + a_{muni,\tau} + v_{i,\tau}\right), \tag{9}$$

where $NJobs_{b,\tau}$ is the number of jobs in buurt b and year τ, $I_{HighVINEX,i}$ is a dummy equal to one for non-VINEX buurts in the top quartile of exposure in their municipality, and a_b and $a_{muni,\tau}$ are buurt and municipality by year fixed effects. The coefficients of interest are g_τ, which estimate the relative difference in the number of jobs between high exposure non-VINEX buurts and other buurts. Standard errors are double-clustered by municipality and year.

The LISA data cover the period between 1996 and 2017, and in equation (9), the omitted category is 1996. Due to the limited time span of the data, we cannot conduct any event-study or diff-in-diffs analysis with respect to the implementation of the VINEX policy. However, we can still display the diverging trajectories that occurred during the implementation of the VINEX program.

Figure 10 displays our results. As in the previous analyses, we report estimates for the full sample of non-VINEX buurts (panel a) and for a sample restricted to high and zero exposure buurts (panel b). Estimates are similar across the two samples, and they show that VINEX construction peaks in the late 1990s and early 2000s, high-exposure buurts gain 12-15% more jobs than lower-exposure buurts in the same municipality and the same year. This is a really large gap, since total job growth across non-VINEX buurts in the Randstad is approximately 30% over the entire period between 1996 and 2015 (see Section 3.3).

We then explore differences across jobs in different categories of occupations using a more parsimonious Poisson regression specification, in the same fashion as equation (3). For this specification, we restrict the sample to the years 1996 and 2015:

$$NJobs_{b,\tau} = \exp\left(g_{end}(I_{HighVINEX,i} \times I_{\tau=2015}) + a_b + a_{muni,\tau} + u_{i,\tau}\right), \tag{10}$$

where the coefficient g_{end} captures incremental growth in jobs in high-exposure buurts over the full time span between 1996 and 2015. In column 1 of Table 8, we estimate equation (10), setting $NJobs_{b,\tau}$ equal to the total number of jobs per buurt, to provide a comparison against

the results in the figure. In column 2, we expand the specification with a triple-interaction term for high-income buurts, as done for the price regressions. In columns 3 to 5, we set the dependent variable as the number of jobs in sectors belonging to Agriculture or Manufacturing, Non-Tradable Services, and Tradable Services.

In the full sample, we find that high-exposure buurts gain 11.25% more jobs than other buurts. In the restricted sample, the estimate is 14%. These results align with the evidence in the figures. The triple-interaction term for high-income buurts is positive, but not statistically significant.

Most importantly, across sectors, we find that the effect for Agriculture or Manufacturing is not statistically significant. The effect on Non-Tradables is significant only in the full sample, with a point estimate of 6.7%. The effect on Tradables is highly significant in both samples, with a point estimate of 23% in the full sample and approximately 32% in the restricted sample.

Overall, the results point to a clear spillover on job growth in areas neighboring the VINEX buurts. However, the effect appears specifically concentrated in Tradable Services, which offer higher wages and attract more productive high-income individuals. This matches the occupations of individuals moving to VINEX neighborhoods. Thus, these job spillovers may be driven by the creation of new firms or branches that employ VINEX residents.

In Appendix Table A.6 we estimate a specification over the full sample of non-VINEX buurts in which we replace the exposure measure with the share of VINEX land within 5-Km ($ShareVINEX$). The results are broadly consistent with Table 8. The main difference is that the coefficient for the change in total jobs, while positive, is not statistically significant. However, when studying differences across job categories, we again find large and significant effects for Tradable Services.

5 Conclusion

The impact of factors and regulations constraining new housing supply have long been at the center of active debates among both policymakers and scholars. In many advanced economies, including the U.S., the construction of new housing, and particularly of single-family homes, has fallen short of household formation for more than 15 years. The academic literature overwhelmingly attributes this shortfall to regulatory and geographic barriers, emphasizing their consequences for housing prices, residential mobility, local labor markets, and ultimately economic growth.

However, the literature still lacks comprehensive empirical evidence on the effects of

large-scale policies easing housing supply restrictions. This gap is determined both by data limitations and the scarcity of ideal quasi-experimental settings. Moreover, policies that expand local housing supply are typically shaped by local market conditions and local political dynamics, which in turn affect their timing, design, and ultimate impact.

We provide a novel contribution to the literature by exploiting the unique setting of the VINEX program, a large-scale housing expansion mandated by the Dutch government in the mid-1990s. The program resulted in the construction of hundreds of new suburban neighborhoods, after decades in which housing development on new land had been tightly restricted to preserve Dutch agricultural resources. The allocation of land to new development was decided through a non-market based mechanism, and is not associated in the data with stronger price growth in the years preceding the policy.

We find that the allocation of land to new housing development triggered a sharp increase in housing production, consistent with binding supply constraints prior to the VINEX program. The new neighborhoods attracted a population that was older, higher income, and more likely to be homeowners than the rest of the Dutch population, with a disproportionately high share employed in Tradable Services, which are the highest-paying sectors of the economy.

Pre-existing neighborhoods with a large share of VINEX development in their proximity experienced substantial declines in house prices and changes in local employments, with sharp increases in the number of jobs, in particular in Tradable Services sectors. However, the house price effects were entirely concentrated in higher-income neighborhoods, while low-income neighborhoods saw no impact on housing prices.

Taken together, our results suggest that relaxing restrictions on housing supply can promote the concentration of high-income households and high-paying jobs, with the potential to substantially stimulate local economic growth. At the same time, the benefits in terms of lower housing costs for low-income neighborhoods are limited, and the resulting concentration dynamics may exacerbate inequality within cities. A structural model calibrated to our data could provide a comprehensive assessment of the aggregate effects and the broader welfare implications of our findings.

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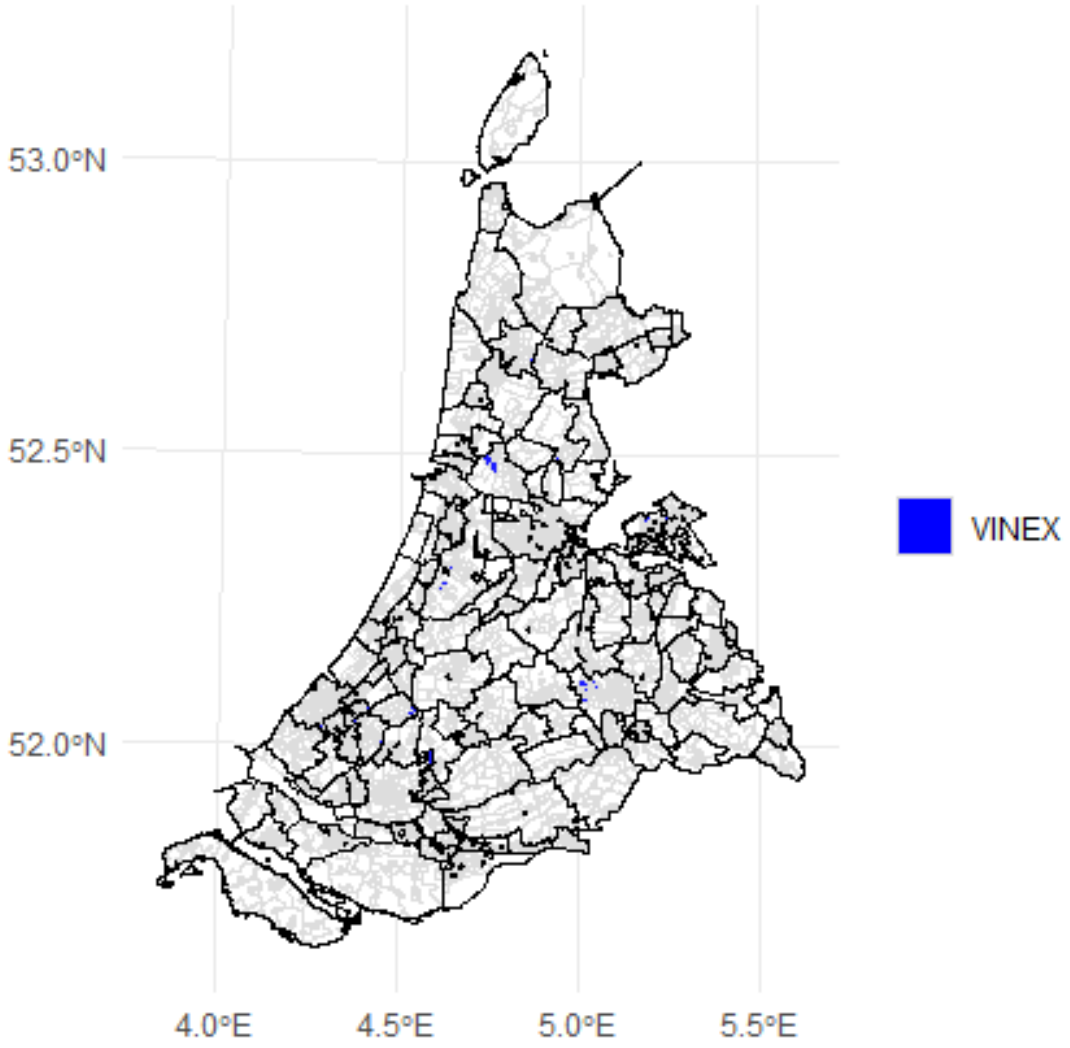
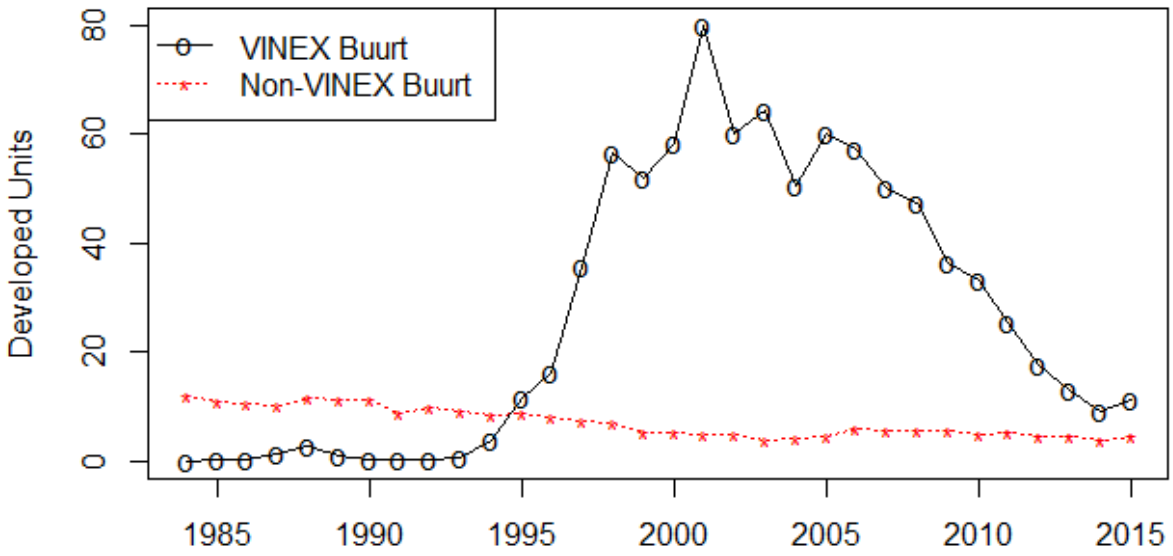
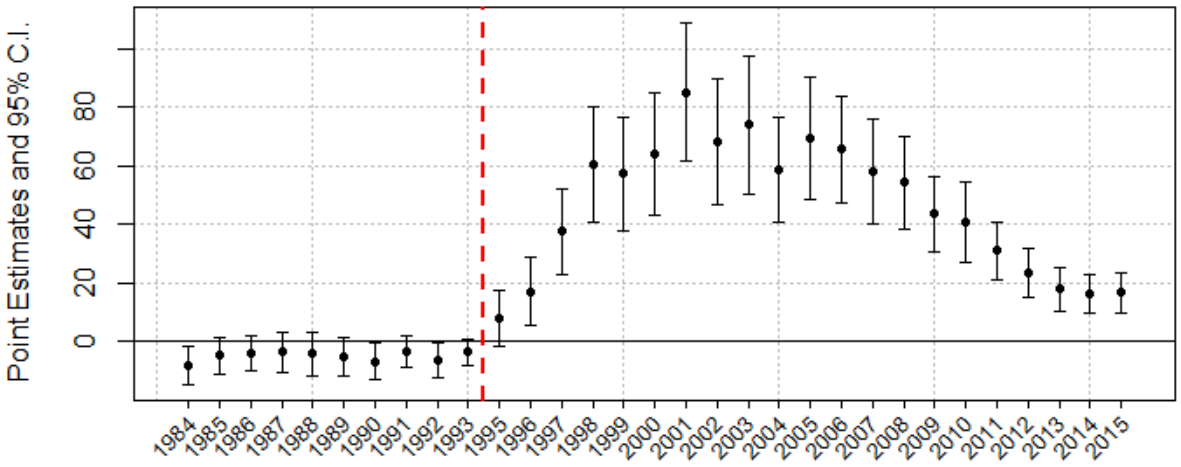


Figure 1: Spatial distribution of VINEX buurts, highlighted in blue, in the Randstad (western Netherlands).

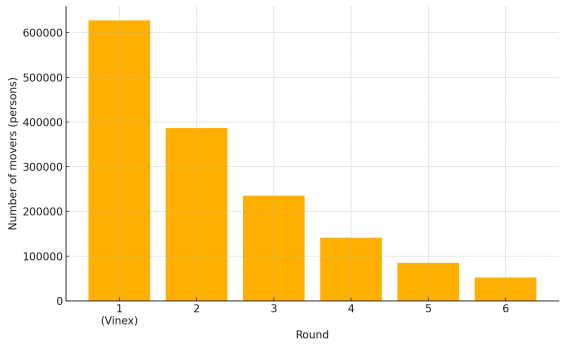


(a) Raw Averages: Developed Units

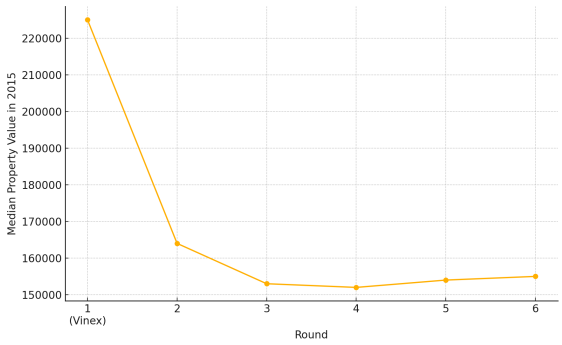


(b) Difference-in-Differences VINEX Developed Units

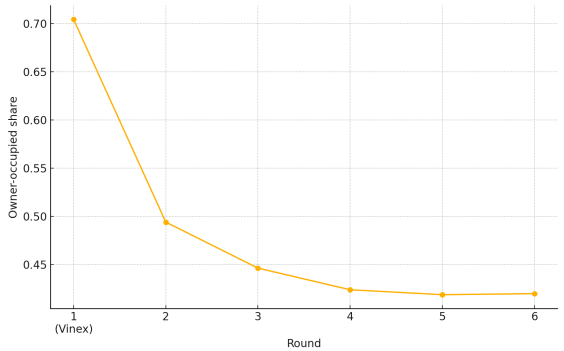
Figure 2: The figure displays the gap in the number of developed units between VINEX and non-VINEX buurts between 1984 and 2015. Panel (a) displays the average number of new housing units developed across buurts. Panel (b) shows the excess number of units developed on average across VINEX buurts, measured by coefficients $\gamma_{t,VINEX}$ from equation (1). The coefficient for the omitted category in 1994 is set to zero.



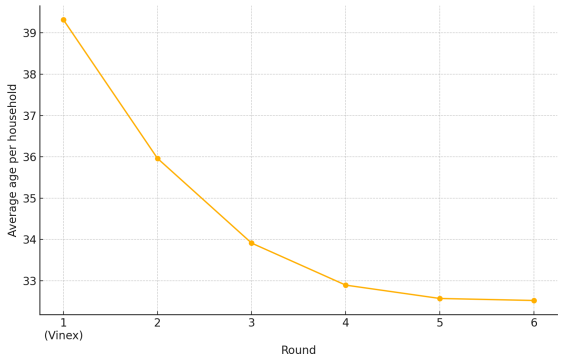
(a) Number of movers per round



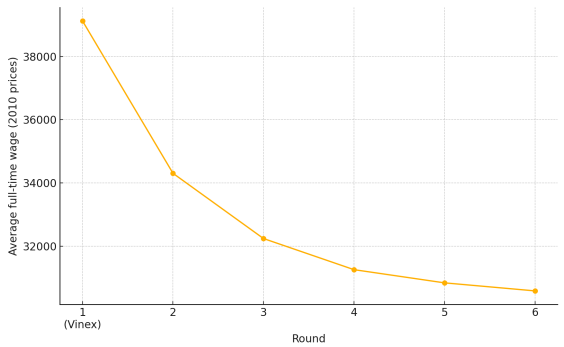
(b) Median property value per round (2015)



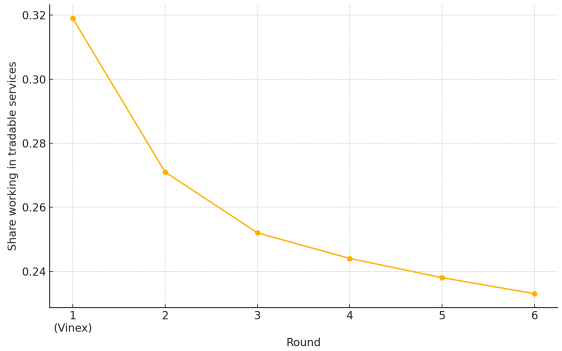
(c) Owner-occupied share per round



(d) Average age per household per round

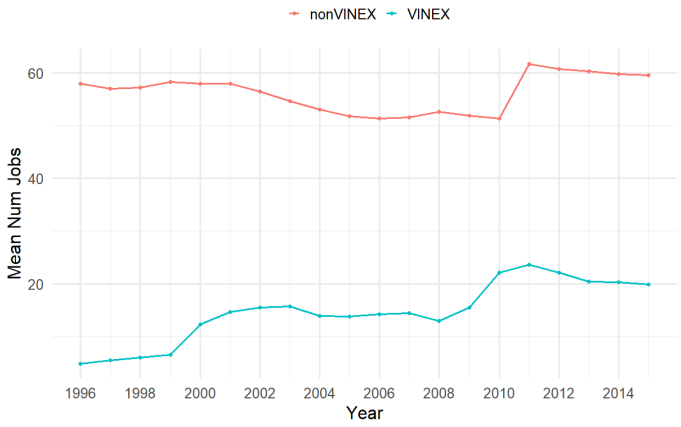


(e) Average full-time wage (2010 prices), per round

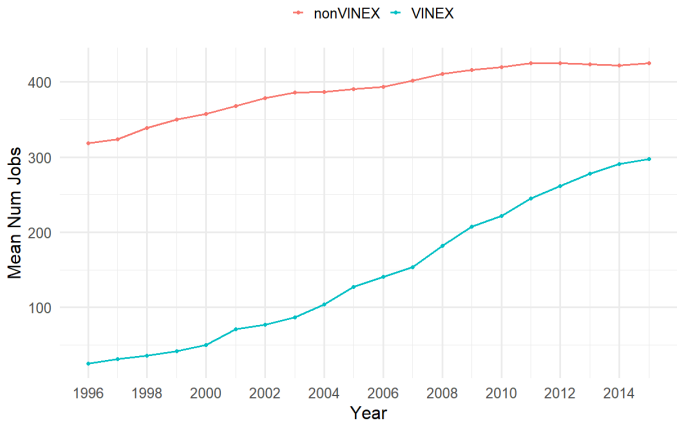


(f) Share employed in Tradable Services

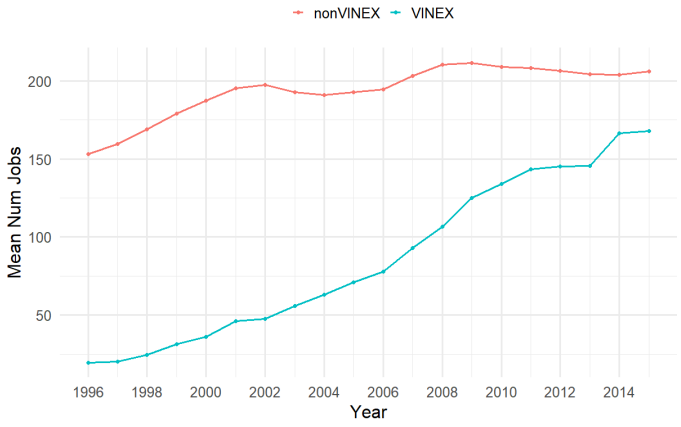
Figure 3: Evidence on moving chains generated by the VINEX program. The x-axis corresponds to different moving rounds, in which round 1 consists of individuals moving to VINEX, round 2 consists of individuals moving into the properties vacated by those who move to VINEX, and so on. Panel (a) shows the number of movers we track in each round, panel (b) shows the median property value of the move-in properties (for round 1, these are VINEX houses), panel (c) shows the share of individuals who are owner-occupiers after move-in, panel (d) shows the average age of movers per household, panel (e) shows the average full-time wage in 2010 prices, and panel (f) shows the share of movers employed in Tradable Services occupations. The results are based on information on address registration available from Statistics Netherlands over the period from 1995 to 2015.



(a) Agriculture or Manufacturing

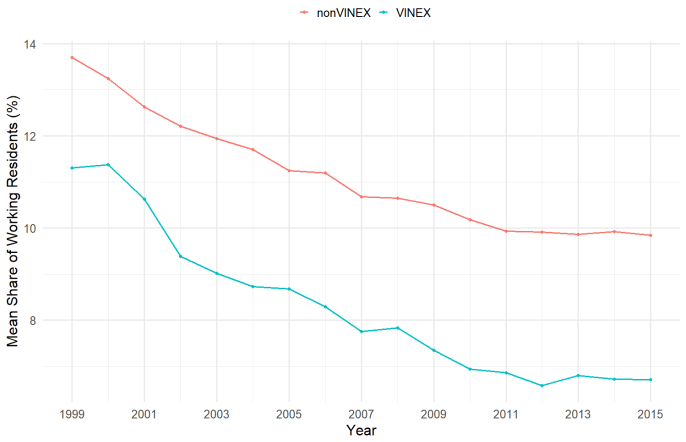


(b) Non-Tradable Services

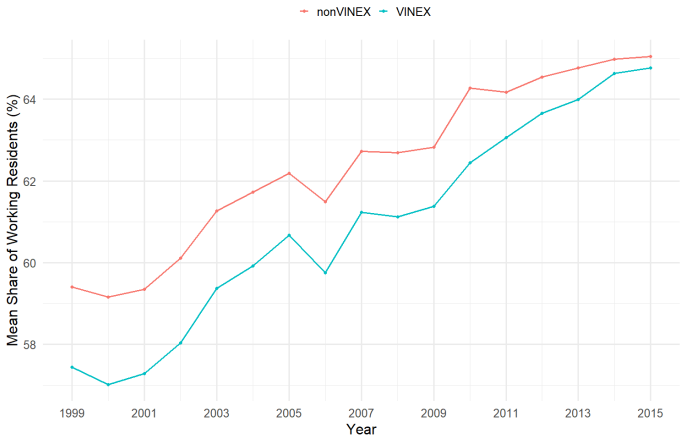


(c) Tradable Services

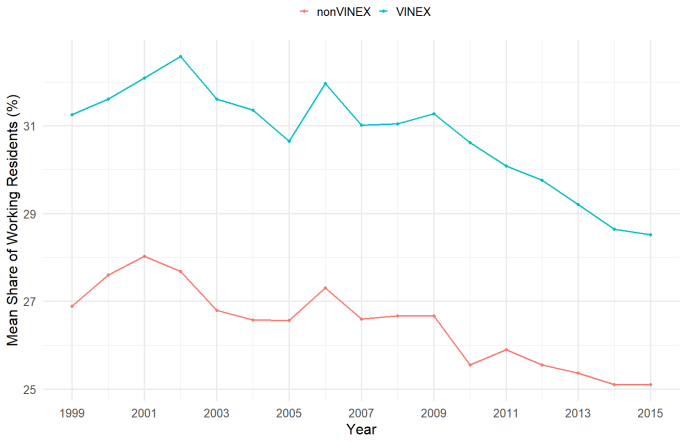
Figure 4: The figure displays the time series of the average number of jobs located in each buurt, separately for VINEX and non-VINEX buurts, over the years from 1996 to 2015. Panel (a) displays results for jobs in sectors belonging to the agriculture or manufacturing category, panel (b) displays results for jobs in non-tradable services sectors, and panel (c) displays results for jobs in tradable services sectors. All estimates are based on the LISA dataset.



(a) Agriculture or Manufacturing



(b) Non-Tradable Services



(c) Tradable Services

Figure 5: The figure displays the time series of the share of residents employed in a sector that belongs to a specific macro-category. The share is calculated out of all employed residents, and separately for VINEX and non-VINEX buurts, over the years from 1999 to 2015. Panel (a) displays the share for sectors belonging to the agriculture or manufacturing category, panel (b) displays the share for non-tradable services sectors, and panel (c) displays the share for tradable services sectors. All estimates are based on administrative data available from Statistics Netherlands.

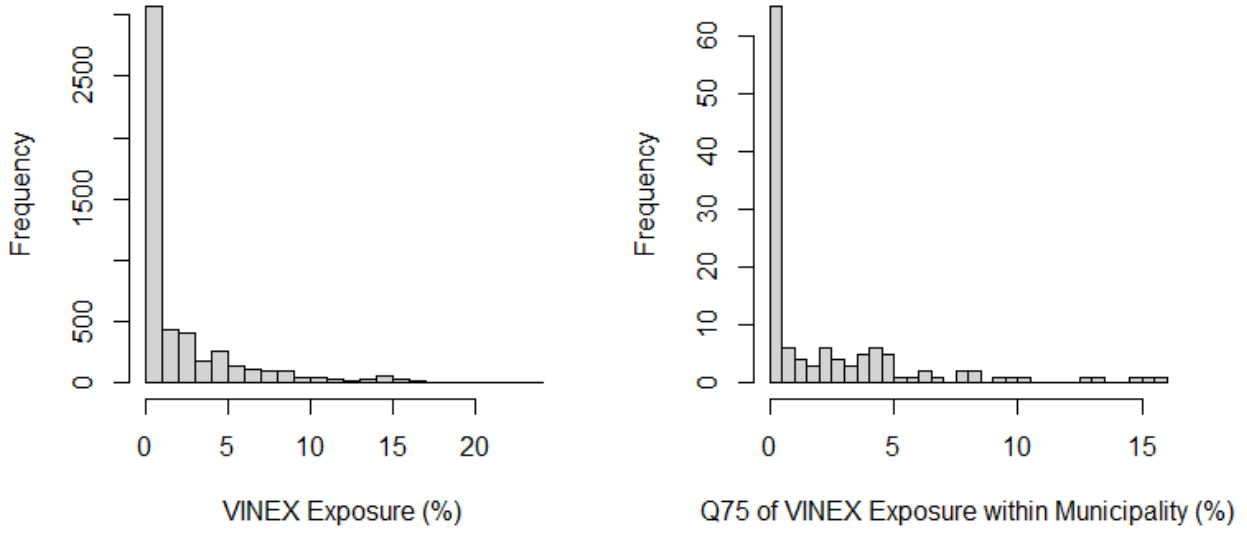


Figure 6: Distribution of VINEX exposure, for non-VINEX buurts located in the Randstad. The panel on the left shows the distribution of the fraction of land covered by VINEX buurts within a 5-kilometer radius. The panel on the right shows the 75th percentile of exposure (share of land belonging to VINEX buurts within a 5-Km radius) across non-VINEX buurts located in the same municipality (gemeente). The latter is used to identify local "high-exposure" buurts within each municipality.

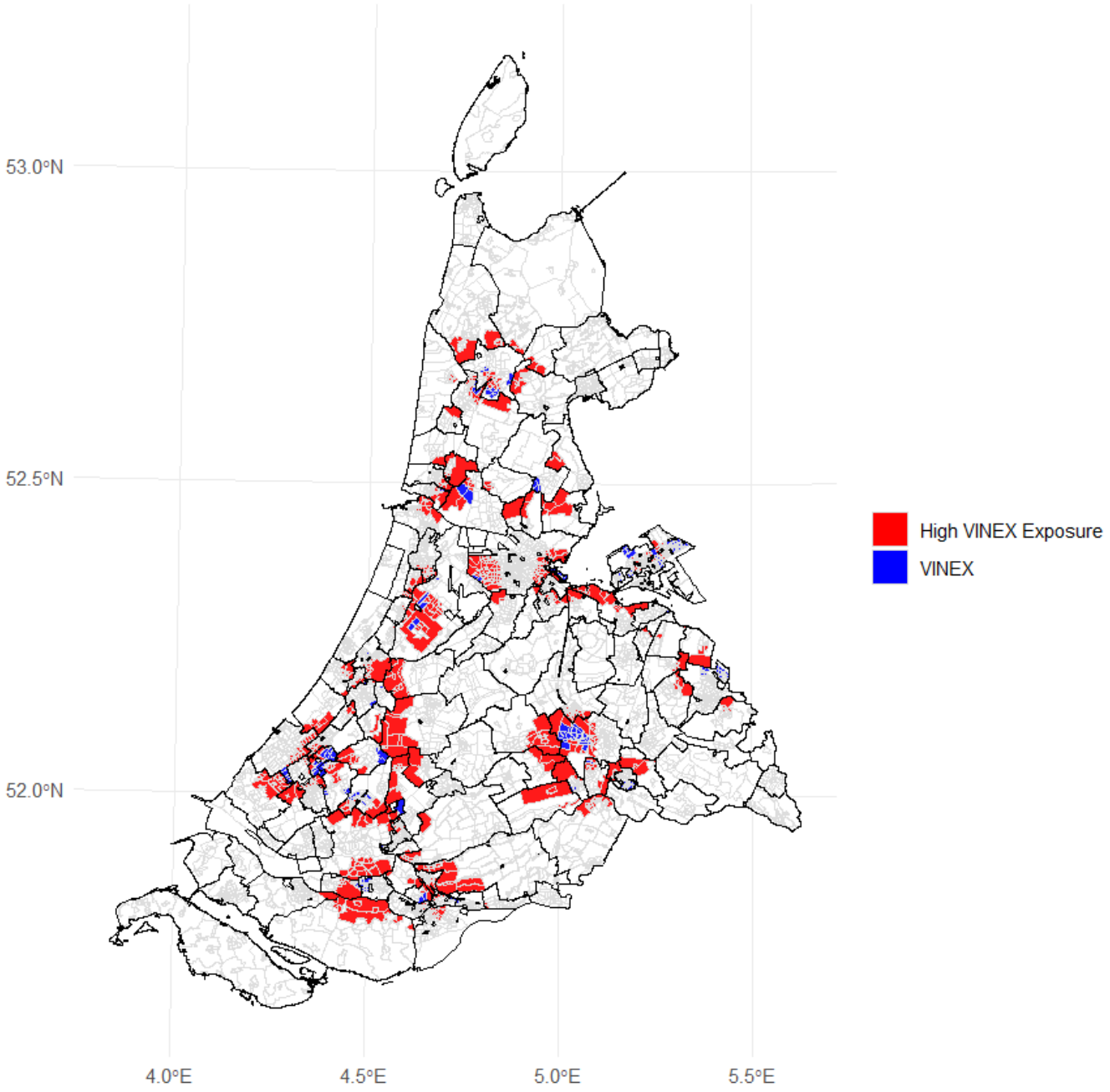
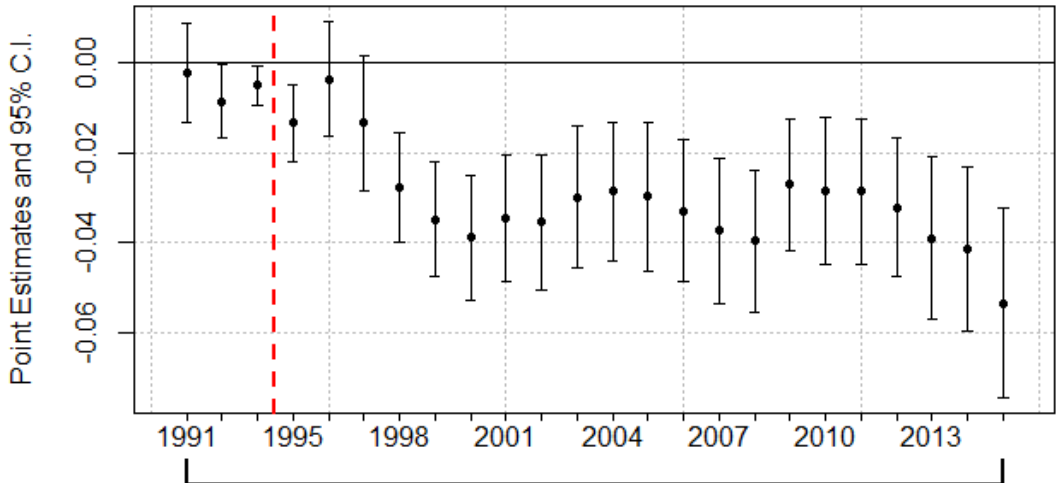
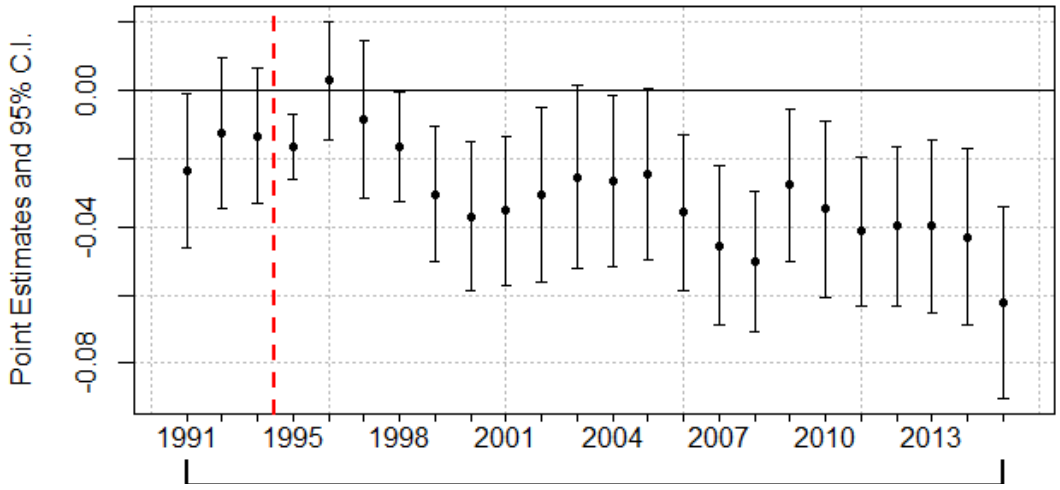


Figure 7: Spatial distribution of VINEX exposure, for non-VINEX buurts located in the Randstad. VINEX buurts are highlighted in blue, while buurts with high VINEX exposure (top quartile in VINEX land within 5-Km radius among buurts in the same municipality) are highlighted in red.



(a) Full Sample of All non-VINEX Buurts

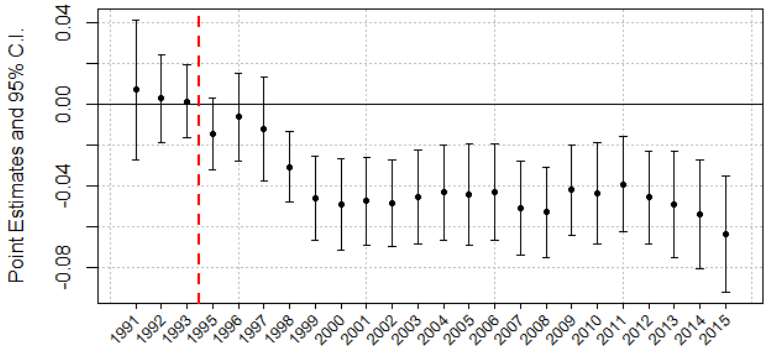


(b) High and Zero Exposure non-VINEX Buurts Only

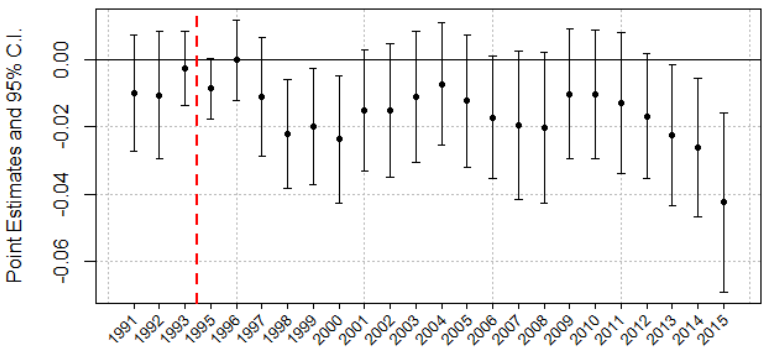
Figure 8: The figure displays estimates from the following regression equation:

$$log(p_{i,\tau}) = \sum_{\tau=1991:2015} d_\tau(I_{HighVINEX,i} \times I_\tau) + BX_i + a_b + a_{muni,\tau} + \epsilon_{i,\tau},$$

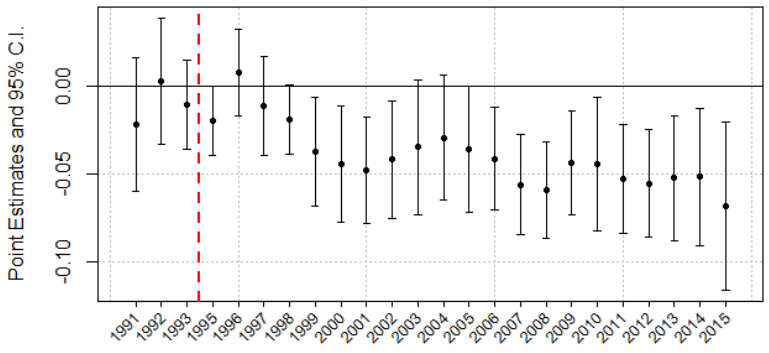
where $log(p_{i,\tau})$ is the log sales price of property i in year τ, $I_{HighVINEX}$ is a dummy equal to one for buurts in the top quartile of exposure to VINEX in their municipality, I_τ is a dummy equal to one for sales in year τ, and a_b and $a_{muni,t}$ are buurt and municipality by year fixed effects. Panel (a) displays point estimates and 95% confidence intervals for d_τ based on the full sample of sales in non-VINEX buurts, while in panel (b) the sample is restricted to burts with high exposure to VINEX ($I_{HighVINEX,i} = 1$) or zero exposure. The omitted coefficient d_{1994} is equal to zero.



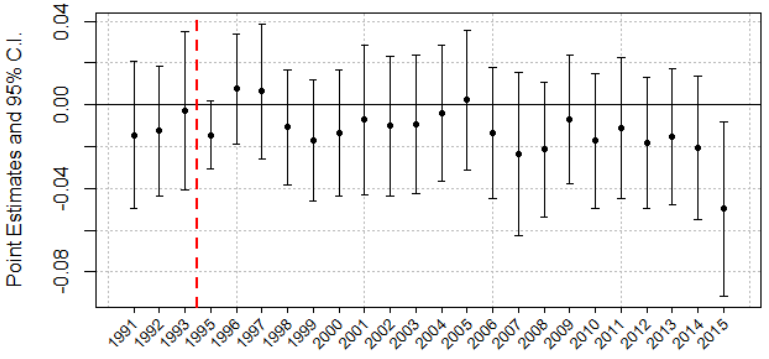
(a) Above Median Income Buurts (Full Sample)



(b) Below Median Income Buurts (Full Sample)



(c) Above Median Income Buurts (High and Zero Exposure)

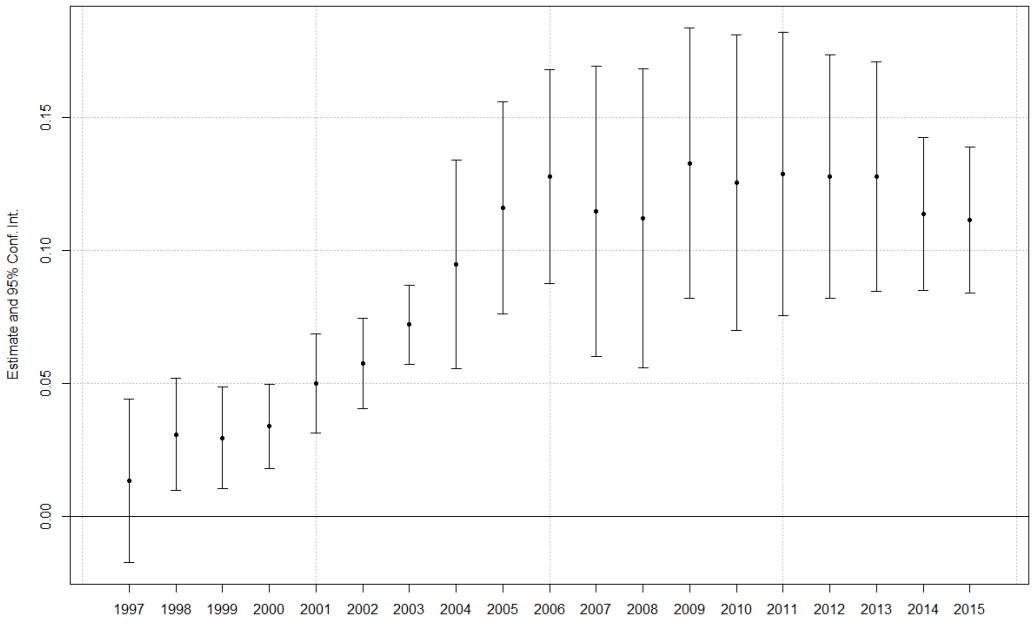


(d) Below Median Income Buurts (High and Zero Exposure)

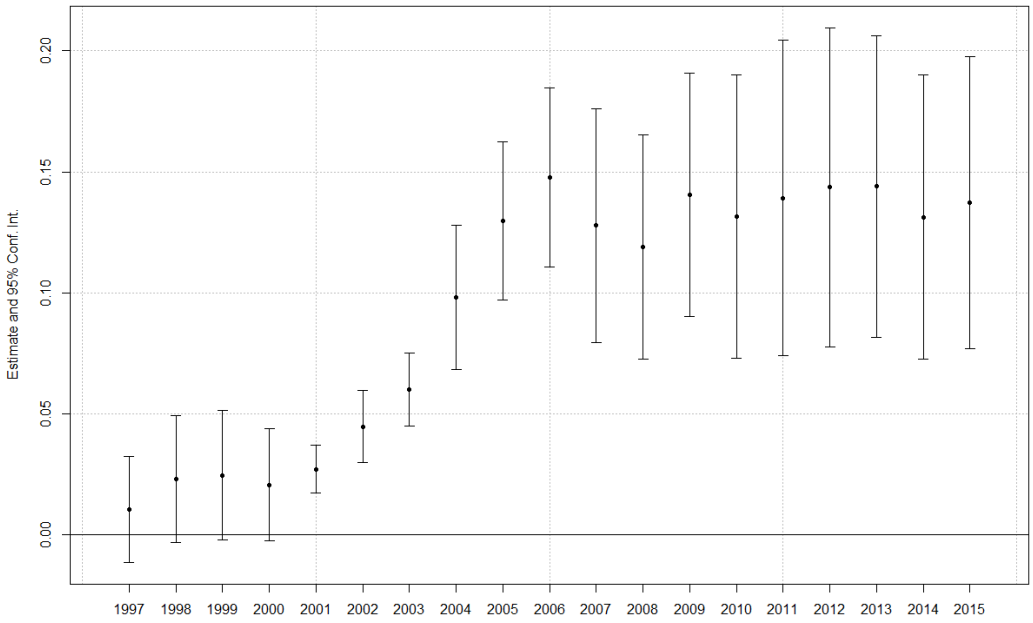
Figure 9: The figure displays estimates from the following regression equation:

$$log(p_{i,\tau}) = \sum_{\tau=1991:2015} f_\tau(I_{HighVINEX,i} \times I_\tau \times I_{HighInc}) + \sum_{\tau=1991:2015} g_\tau(I_{HighVINEX,i} \times I_\tau \times I_{LowInc}) + BX_i + a_b + a_{muni,\tau,HighInc} + \epsilon_{i,\tau},$$

where $log(p_{i,\tau})$ is the log sales price of property i in year τ, $I_{HighVINEX}$ is a dummy equal to one for buurts in the top quartile of exposure to VINEX in their municipality, I_τ is a dummy equal to one for sales in year τ, $I_{HighInc}$ is a dummy equal to one for buurts with income above the median in their municipality, I_{LowInc} is a dummy for buurts that have income below median in their municipality, and a_b and $a_{muni,t}$ are buurt and municipality by year fixed effects. Panels (a) and (b) display results for the full sample of non-VINEX buurts, while panels (c) and (d) report results for the subsample including only high exposure and zero exposure buurts. Panels (a) and (c) display point estimates and 95% confidence intervals for f_τ, while panels (b) and (d) display estimates of g_τ. The omitted coefficients f_{1995} and g_{1995} are equal to zero.



(a) Full Sample of All non-VINEX Buurts



(b) High and Zero Exposure non-VINEX Buurts Only

Figure 10: The figure displays estimates from the following Poisson regression specification:

$$NJobs_{b,\tau} = \exp\left(\sum_{\tau=1997:2015} g_\tau(I_{HighVINEX,i} \times I_\tau) + a_b + a_{muni,\tau} + v_{i,\tau}\right),$$

where $NJobs_{b,\tau}$ is number of jobs located in non-VINEX buurt b in year τ, $I_{HighVINEX}$ is a dummy equal to one for buurts in the top quartile of exposure to VINEX in their municipality, I_τ is a dummy equal to one for sales in year τ, and a_b and $a_{muni,\tau}$ are buurt and municipality by year fixed effects. Panel (a) displays point estimates and 95% confidence intervals for g_τ based on the full sample of sales in non-VINEX buurts, while in panel (b) the sample is restricted to burts with high exposure to VINEX ($I_{HighVINEX,i} = 1$) or zero exposure. The regression is estimated over the sample of years from 1996 to 2015, and the omitted coefficient g_{1996} is equal to zero.

	Panel A: New Construction By Buurt and Year				
	Q1	Median	Mean	Q3	Observations
Number of New Units	0.00	0.00	8.03	1.00	158,048
Sqm New Units	0.00	0.00	940.80	46.00	158,048
Sqm per New Unit	43.00	53.00	74.78	72.94	43,332
	Panel B: House Sales Data				
	Q1	Median	Mean	Q3	Observations
Sales Price	132,731	183,781	217,843	255,000	1,107,841
Listing Price	139,000	194,672	232,127	269,999	1,107,841
Sales Year	2000	2005	2005	2010	1,107,841
Gross Volume	240	320	332	390	1,107,841
Rooms Number	3.00	4.00	4.23	5.00	1,107,841
Is Single-Family	0.00	0.00	0.49	1.00	1,107,841
Is Townhouse	0.00	0.00	0.09	0.00	1,107,841
Built Year	1942	1972	1964	1988	1,107,841
	Panel C: Employment Data by Buurt and Year				
	Q1	Median	Mean	Q3	Observations
N. Jobs	69	205	621	611	111,080
N. Jobs Agriculture and Manufacturing	1.00	5.00	54.36	22.00	111,080
N. Jobs Non-Tradable Services	34.0	121.0	377.5	383.0	111,080
N. Jobs Tradable Services	16.0	48.0	189.1	142.0	111,080
	Panel D: Demographic Data by Buurt and Year				
	Q1	Median	Mean	Q3	Observations
Total Population	435	1130	1614	2094	95,980
Age	35.20	38.50	39.02	42.00	95,980
Age (25-64)	42.20	44.40	44.15	46.30	95,973
Move-in Distance (Km) Past Year	1.96	3.06	4.35	4.77	87,891
N. Move-in Past Year	52.0	122.0	201.7	240.0	87,908
N. Workers Agriculture and Manufacturing	29.00	57.00	84.69	106.00	67,750
N. Workers Non-Tradable Services	118.0	348.0	511.7	681.0	78,149
N. Workers Tradable Services	60.0	152.0	216.6	283.0	75,288

Table 1: This table displays summary statistics of the main datasets used in our study. Panel A displays statistics of new construction by buurt and year between 1984 and 2015, based on the BAG data. Panel B displays statistics of the housing transactions data made available by the Dutch Association of Realtors. Panel C displays statistics for the number of jobs and businesses by buurt and year between 1996 and 2015, based on employment geo-location data made available by LISA. Panel D displays statistics for demographics, mobility by buurt and year between 1995 and 2015, and local employment information between 1999 and 2015, based on data from Statistics Netherlands. The detailed description of the datasets is in Section 2.2.

	Dependent Variable: $\Delta log(\mu(P)_{1991,1995})$			
	(1)	(2)	(3)	(4)
$ShareVINEX_{5km}$	0.1307		0.2233	
	(0.1831)		(0.2861)	
$I_{HighVINEX}$		-0.0137		-0.0126
		(0.0163)		(0.0173)
Fixed-effects				
Municipality			Yes	Yes
Observations	2,173	2,173	2,173	2,173
R^2	0.00023	0.00033	0.06551	0.06551

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 2: The table displays the relationship between buurt-level mean price growth between 1991 and 1994, and post-1994 VINEX development, based on the following regression specification:

$$\Delta log(\mu(P)_{1991,1995,b}) = \delta ExposureVINEX_b + a_{muni} + e_b$$

The variable $ExposureVINEX_b$ is equal either to $ShareVINEX_{5km}$, which is the share of land belonging to VINEX buurts within a 5-Km radius of each buurt, or $I_{HighVINEX}$, which is a dummy equal to one for VINEX that are in the quartile of $ShareVINEX_{5km}$ within their municipality (gemeente). a_{muni} is a municipality fixed effect, included in the specification in columns 3 and 4. The sample is restricted to buurts that were not part of the VINEX program.

	Panel A: Full Sample (All non-VINEX Buurts)				
	Dependent Variable: log(*Price*)				
	(1)	(2)	(3) Above Med Income	(4) Below Med Income	(5)
$I_{HighVINEX} \times I_{post}$	-0.0603***	-0.0275***	-0.0449***	-0.0104	-0.0114
	(0.0115)	(0.0043)	(0.0086)	(0.0072)	(0.0071)
$I_{HighVINEX} \times I_{post} \times I_{HighInc}$					-0.0337**
					(0.0135)
log(volume)	0.6258***	0.3257***	0.3729***	0.2798***	0.3246***
	(0.0794)	(0.0763)	(0.0793)	(0.0762)	(0.0765)
Additional Controls	No	Yes	Yes	Yes	Yes
Fixed-effects					
Buurt	Yes	Yes	Yes	Yes	Yes
Municipality by Year	Yes	Yes	Yes	Yes	No
Municipality by Year by $I_{HighIncome}$	No	No	No	No	Yes
Observations	1,049,255	1,049,255	510,543	527,552	1,038,095
R^2	0.80144	0.87624	0.88012	0.87376	0.87720
	Panel B: High and Zero Exposure Buurts Only				
	Dependent Variable: log(*Price*)				
	(1)	(2)	(3) Above Med Income	(4) Below Med Income	(5)
$I_{HighVINEX} \times I_{post}$	-0.0437***	-0.0207**	-0.0328***	-0.0081	-0.0061
	(0.0146)	(0.0084)	(0.0092)	(0.0132)	(0.0127)
$I_{HighVINEX} \times I_{post} \times I_{HighInc}$					-0.0277*
					(0.0156)
log(volume)	0.6200***	0.3121***	0.3481***	0.2737***	0.3109***
	(0.0834)	(0.0759)	(0.0835)	(0.0709)	(0.0761)
Additional Controls	No	Yes	Yes	Yes	Yes
Fixed-effects					
Buurt	Yes	Yes	Yes	Yes	Yes
Municipality by Year	Yes	Yes	Yes	Yes	No
Municipality by Year by $I_{HighIncome}$	No	No	No	No	Yes
Observations	600,627	600,627	288,525	304,249	592,774
R^2	0.79507	0.87321	0.87584	0.87270	0.87468

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 3: The table displays estimates of the spillovers of VINEX housing supply on house prices in non-VINEX buurts. Panel A reports estimates based on the full sample of non-VINEX buurts, while Panel B reports estimates based on the subsample of buurts with high or zero exposure to VINEX. Columns 1 to 4 display estimates from the specification:

$$log(p_{i,t}) = d_{VINEX}\left(I_{HighVINEX,i} \times I_{post,i,t}\right) + AX_i + a_b + a_{muni,t} + e_{i,t},$$

where $log(p_{i,t})$ is the log sales price of property i in year t, $I_{HighVINEX}$ is a dummy equal to one for buurts in the top quartile of exposure to VINEX in their municipality, I_{post} is a dummy equal to one after 1994, and a_b and $a_{muni,t}$ are buurt and municipality by year fixed effects. Column 5 displays estimates from the specification:

$$log(p_{i,t}) = g_{VINEX,H}\left(I_{HighVINEX,i} \times I_{post,i,t} \times I_{HighInc}\right) + g_{VINEX}\left(I_{HighVINEX,i} \times I_{post,i,t}\right) + FX_i + f_b + f_{muni,t,HI} + v_{i,t},$$

where $I_{HighInc}$ is a dummy equal to one in buurts that have average income per capita above the median in the municipality, and f_b and $f_{muni,t,HighInc}$ are buurt and municipality by year by above median income ($I_{HighInc}$) fixed effects.

Dependent Variable:	$\Delta log(S) = log(S_{1995:2015}/S_{1984:1994})$			
	(1)	(3)	(1)	(4)
$ShareVINEX_{5Km}$	5.233***		6.980***	
	(0.6476)		(0.8730)	
$I_{HighVINEX}$		0.2583***		0.2282***
		(0.0546)		(0.0507)
Fixed Effects				
Municipality	No	No	Yes	Yes
Observations	2,173	2,173	2,173	2,173
R^2	0.18820	0.05772	0.65547	0.57841

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 4: The table displays estimates from the following regression specification:

$$log(S_{b,5Km,1996:2015}/S_{b,5Km,1984:1995}) = \gamma ExposureVINEX_{b,5km} + g_{muni} + v_b$$

where $S_{b,5Km,1996:2015}$ ($S_{b,5Km,1984:1995}$) is the number of new units built between 1996 and 2015 (1984 and 1995) within a 5Km radius of non-VINEX buurt b, and g_{muni} is a municipality fixed effect.

	Panel A: Full Sample (All non-VINEX Buurts)			
	Dependent Variable: log($Price$)			
	(1)	(2)	(3)	(4)
			Above Med Income	Below Med Income
	OLS	2SLS	2SLS	2SLS
$\Delta log(\widehat{S}) \times I_{post}$		-0.1096***	-0.1399***	-0.0438
		(0.0285)	(0.0260)	(0.0471)
$\Delta log(S) \times I_{post}$	-0.0328**			
	(0.0131)			
log(volume)	0.3556***	0.3556***	0.3818***	0.3251***
	(0.0677)	(0.0677)	(0.0735)	(0.0635)
Additional Controls	Yes	Yes	Yes	Yes
Fixed Effects				
Buurt	Yes	Yes	Yes	Yes
Municipality by Year	Yes	Yes	Yes	Yes
Observations	783,978	783,978	391,398	389,664
R^2	0.88137	-	-	-

	Panel B: High and Zero Exposure Buurts Only			
	Dependent Variable: log($Price$)			
	(1)	(2)	(3)	(4)
			Above Med Income	Below Med Income
	OLS	2SLS	2SLS	2SLS
$\Delta log(\widehat{S}) \times I_{post}$		-0.0532**	-0.0826***	-0.0120
		(0.0209)	(0.0260)	(0.0463)
$\Delta log(S) \times I_{post}$	-0.0305*			
	(0.0165)			
log(volume)	0.3330***	0.3330***	0.3549***	0.3060***
	(0.0712)	(0.0712)	(0.0762)	(0.0674)
Additional Controls	Yes	Yes	Yes	Yes
Fixed Effects				
Buurt	Yes	Yes	Yes	Yes
Municipality by Year	Yes	Yes	Yes	Yes
Observations	457,222	457,222	224,695	230,453
R^2	0.87640	-	-	-

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 5: The table displays estimates of the inverse supply elasticity (elasticity of prices to new supply) in non-VINEX buurts. Panel A reports estimates based on the full sample of non-VINEX buurts, while Panel B reports estimates based on the subsample of buurts with high or zero exposure to VINEX. Column 1 displays OLS estimates from the specification:

$$log(p_{i,t}) = \delta_S \left(\Delta log(S_{b(i),k}) \times I_{post,i,t}\right) + AX_i + a_b + a_{muni,t} + e_{i,t}$$

where $log(p_{i,t})$ is the log sales price of property i in year t, $\Delta log(S_{b(i),k}$ is the log change in new housing construction between before and after 1994 in the 5-Km radius surrounding buurt $b(i)$, in which property i is located, I_{post} is a dummy equal to one after 1994, and a_b and $a_{muni,t}$ are buurt and municipality by year fixed effects. Columns 2, 3, and 4 display 2SLS estimates, in which $\Delta log(S) \times I_{post}$ is instrumented using $I_{HighVINEX} \times I_{post}$ (see equations 7 and 6), where $I_{HighVINEX}$ is a dummy equal to one for buurts in the top quartile of exposure to VINEX in their municipality.

Dependent Variables:	Panel A: Full Sample 1995-2005 (All non-VINEX Buurts)					
	m_{out}^{VINEX}		m_{in-out}		m_{in}	
	(1)	(2)	(3)	(4)	(5)	(6)
$I_{HighVINEX}$	0.0032***	0.0027***	0.0002	0.0014	-0.0014	0.0051
	(0.0005)	(0.0005)	(0.0021)	(0.0018)	(0.0025)	(0.0031)
$I_{HighVINEX} \times I_{HighInc}$		0.0009		-0.0002		-0.0143***
		(0.0009)		(0.0032)		(0.0039)
Fixed-effects						
Municipality by Year	Yes		Yes		Yes	
Municipality by Year by $I_{HighIncome}$		Yes		Yes		Yes
Fit statistics						
Observations	14,949	14,783	42,706	41,937	44,072	43,139
R^2	0.49628	0.52529	0.04905	0.08630	0.13603	0.17892

Dependent Variables:	Panel B: High and Zero Exposure Buurts Only 1995-2005					
	m_{out}^{VINEX}		m_{in-out}		m_{in}	
	(1)	(2)	(3)	(4)	(5)	(6)
$I_{HighVINEX}$	0.0039***	0.0032***	0.0031	0.0026	0.0025	0.0091*
	(0.0005)	(0.0008)	(0.0027)	(0.0015)	(0.0035)	(0.0047)
$I_{HighVINEX} \times I_{HighInc}$		0.0018		0.0040		-0.0142*
		(0.0014)		(0.0044)		(0.0069)
Fixed-effects						
Municipality by Year	Yes		Yes		Yes	
Municipality by Year by $I_{HighIncome}$		Yes		Yes		Yes
Fit statistics						
Observations	7,273	7,198	26,228	25,679	27,250	26,570
R^2	0.58655	0.62867	0.06673	0.11766	0.15009	0.20057

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 6: The table displays estimates of the effects of VINEX housing supply on mobility in non-VINEX buurts. The time period covers the years from 1995 to 2005. Panel A reports estimates based on the full sample of non-VINEX buurts, while Panel B reports estimates based on the subsample of buurts with high or zero exposure to VINEX. Columns 1 and 3 to 5 display estimates from the specification, based on observations from 1996 and 2015 only:

$$m_{x,b,\tau} = M_{VINEX} I_{HighVINEX,b} + n_{muni,\tau} + v_{b,\tau}$$

where $m_{x,b,\tau}$ is either the share of individuals moving to VINEX (m_{out}^{VINEX}), the difference between individuals moving in and out as a share of population (m_{in-out}), and the share of individuals moving in (m_{in}) in buurt b and year τ, $I_{HighVINEX}$ is a dummy equal to one for buurts in the top quartile of exposure to VINEX in their municipality, and $n_{muni,\tau}$ are municipality by year fixed effects. Columns 2, 4, and 6 display estimates from the specification:

$$m_{x,b,\tau} = M_{VINEX} I_{HighVINEX,i} + M_{VINEX} \left(I_{HighVINEX,b} \times I_{HighIncome,b}\right) + n_{muni,\tau} + v_{b,\tau}$$

where $I_{HighInc}$ is a dummy equal to one in buurts that have average income per capita above the median in the municipality, and $n_{muni,t,HighInc}$ are municipality by year by above median income ($I_{HighInc}$) fixed effects.

Dependent Variables:	Panel A: Full Sample 1995-2015 (All non-VINEX Buurts)					
	m_{out}^{VINEX}		m_{in-out}		m_{in}	
	(1)	(2)	(3)	(4)	(5)	(6)
$I_{HighVINEX}$	0.0022***	0.0020***	0.0006	0.0017	-0.0024	0.0043
	(0.0004)	(0.0004)	(0.0016)	(0.0016)	(0.0022)	(0.0031)
$I_{HighVINEX} \times I_{HighInc}$		0.0002		-0.0018		-0.0156**
		(0.0007)		(0.0013)		(0.0060)
Fixed-effects						
Municipality by Year	Yes		Yes		Yes	
Municipality by Year by $I_{HighIncome}$		Yes		Yes		Yes
Observations	46,857	46,133	82,348	80,683	84,861	82,870
R^2	0.41748	0.44773	0.04540	0.07961	0.14798	0.19007

Dependent Variables:	Panel B: High and Zero Exposure Buurts Only 1995-2015					
	m_{out}^{VINEX}		m_{in-out}		m_{in}	
	(1)	(2)	(3)	(4)	(5)	(6)
$I_{HighVINEX}$	0.0029***	0.0025***	0.0023	0.0029	-0.0003	0.0083
	(0.0005)	(0.0006)	(0.0023)	(0.0022)	(0.0033)	(0.0049)
$I_{HighVINEX} \times I_{HighInc}$		0.0010		0.0008		-0.0178
		(0.0009)		(0.0014)		(0.0113)
Fixed-effects						
Municipality by Year	Yes		Yes		Yes	
Municipality by Year by $I_{HighIncome}$		Yes		Yes		Yes
Observations	24,787	24,405	50,595	49,392	52,463	51,013
R^2	0.49341	0.53771	0.06463	0.11135	0.16166	0.21436

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 7: The table displays estimates of the effects of VINEX housing supply on mobility in non-VINEX buurts. The time period covers the years from 1995 to 2015. Panel A reports estimates based on the full sample of non-VINEX buurts, while Panel B reports estimates based on the subsample of buurts with high or zero exposure to VINEX. Columns 1 and 3 to 5 display estimates from the specification, based on observations from 1996 and 2015 only:

$$m_{x,b,\tau} = M_{VINEX} I_{HighVINEX,b} + n_{muni,\tau} + v_{b,\tau}$$

where $m_{x,b,\tau}$ is either the share of individuals moving to VINEX (m_{out}^{VINEX}), the difference between individuals moving in and out as a share of population (m_{in-out}), and the share of individuals moving in (m_{in}) in buurt b and year τ, $I_{HighVINEX}$ is a dummy equal to one for buurts in the top quartile of exposure to VINEX in their municipality, and $a_{muni,\tau}$ are municipality by year fixed effects. Columns 2, 4, and 6 display estimates from the specification:

$$m_{x,b,\tau} = M_{VINEX} I_{HighVINEX,i} + M_{VINEX} \left(I_{HighVINEX,b} \times I_{HighIncome,b}\right) + n_{muni,\tau} + v_{b,\tau}$$

where $I_{HighInc}$ is a dummy equal to one in buurts that have average income per capita above the median in the municipality, and $n_{muni,t,HighInc}$ are municipality by year by above median income ($I_{HighInc}$) fixed effects.

	Panel A: Full Sample (All non-VINEX Buurts)				
	Dependent Variable: $NJobs$				
	(1)	(2)	(3)	(4)	(5)
	All		Agric./Manuf.	Non-Trad.	Trad.
$I_{HighVINEX} \times I_{\tau=2015}$	0.1125***	0.0791*	0.0625	0.0673**	0.2336***
	(0.0263)	(0.0435)	(0.0824)	(0.0267)	(0.0743)
$I_{HighVINEX} \times I_{HighInc} \times I_{\tau=2015}$		0.0507			
		(0.0632)			
Fixed-effects					
Buurt	Yes	Yes	Yes	Yes	Yes
Municipality by Year	Yes	No	Yes	Yes	Yes
Municipality by Year by $I_{HighIncome}$	No	Yes	No	No	No
Observations	10,614	9,906	9,650	10,517	10,357
Pseudo R^2	0.95600	0.95961	0.91831	0.95138	0.93393

	Panel B: High and Zero Exposure Buurts Only				
	Dependent Variable: $NJobs$				
	(1)	(2)	(3)	(4)	(5)
	All		Agric./Manuf.	Non-Trad.	Trad.
$I_{HighVINEX} \times I_{\tau=2015}$	0.1397***	0.1327	0.0898	0.0654	0.3192***
	(0.0426)	(0.0902)	(0.1166)	(0.0546)	(0.1220)
$I_{HighVINEX} \times I_{HighInc} \times I_{\tau=2015}$		0.0331			
		(0.1151)			
Fixed-effects					
Buurt	Yes	Yes	Yes	Yes	Yes
Municipality by Year	Yes	No	Yes	Yes	Yes
Municipality by Year by $I_{HighIncome}$	No	Yes	No	No	No
Observations	6,868	6,358	6,293	6,794	6,689
Pseudo R^2	0.95133	0.95453	0.91861	0.94781	0.92683

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 8: The table displays estimates of the effects of VINEX housing supply on job growth in non-VINEX buurts. Panel A reports estimates based on the full sample of non-VINEX buurts, while Panel B reports estimates based on the subsample of buurts with high or zero exposure to VINEX. Columns 1 and 3 to 5 display estimates from the specification, based on observations from 1996 and 2015 only:

$$NJobs_{b,\tau} = \exp\left(g_{end}(I_{HighVINEX,i} \times I_{\tau=2015}) + a_b + a_{muni,\tau} + u_{i,\tau}\right)$$

where $NJobs_{b,\tau}$ is either the total number of jobs (column 1), the total number of jobs in Agriculture or Manufacturing (column 3), Non-Tradable Services (column 4), Tradable Services (column 5), Non-Specialized sectors (column 6), and Specialized sectors (column 7) in buurt b and year τ, $I_{HighVINEX}$ is a dummy equal to one for buurts in the top quartile of exposure to VINEX in their municipality, $I_{\tau=2015}$ is a dummy equal to in 2015, and a_b and $a_{muni,\tau}$ are buurt and municipality by year fixed effects. Column 2 displays estimates from a specification:

$$NJobs_{b,\tau} = \exp\left(g_{end}(I_{HighVINEX,i} \times I_{\tau=2015}) + g_{end,H}(I_{HighVINEX,i} \times I_{HighInc} \times I_{\tau=2015}) + f_b + f_{muni,\tau} + v_{i,\tau}\right)$$

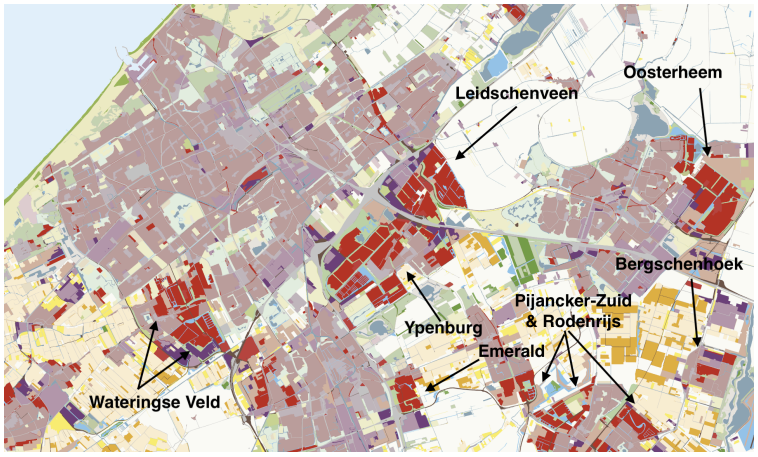
where $I_{HighInc}$ is a dummy equal to one in buurts that have average income per capita above the median in the municipality, and f_b and $f_{muni,t,HighInc}$ are buurt and municipality by year by above median income ($I_{HighInc}$) fixed effects.

Appendix:

The Broader Effects of New Housing Supply: Movers, Prices, and Workplaces

(intended for online publication)

A.I Additional Figures and Tables



(a) Land Use and Developed Area, The Hague (2015)



(b) Planning Restrictions for Housing, The Hague

Figure A.1: The figures display two maps of the Hague urban area from PBL, the Netherlands Environment Assessment Agency. Panel 1(a) shows the 2015 land use map combined with the extent of land use changes from 1996-2015, during the VINEX period. Arrows point towards VINEX developments and their names. Areas in red (housing) and purple (infrastructure and work) reflect built-up areas. Areas in yellow reflect semi-built-up areas (e.g., greenhouse agriculture). Areas in white consist of unbuilt agricultural land, which is most suitable for development. Areas in green reflect land used for nature or leisure (e.g., forest, beach, parks). Most importantly, lighter colors reflect area already built-up before 1996, darker colors reflect land use change in the 1996-2015 period. Nearly all urban expansion in this period was due to the VINEX programme. The location of these areas can largely be explained by the fact that the central government sought to select locations with empty land available for development and for which national and provincial land usage restrictions would also easily allow for development. Panel 1(b) overlays the same map with a contemporary map developed by PBL to quantify the tightness of planning restrictions for housing. (Dark) red areas are very difficult to (re)develop, orange areas are difficult to (re)develop, and yellow areas only face moderate restrictions. Most VINEX areas were built on undeveloped land that did not face any planning restrictions.

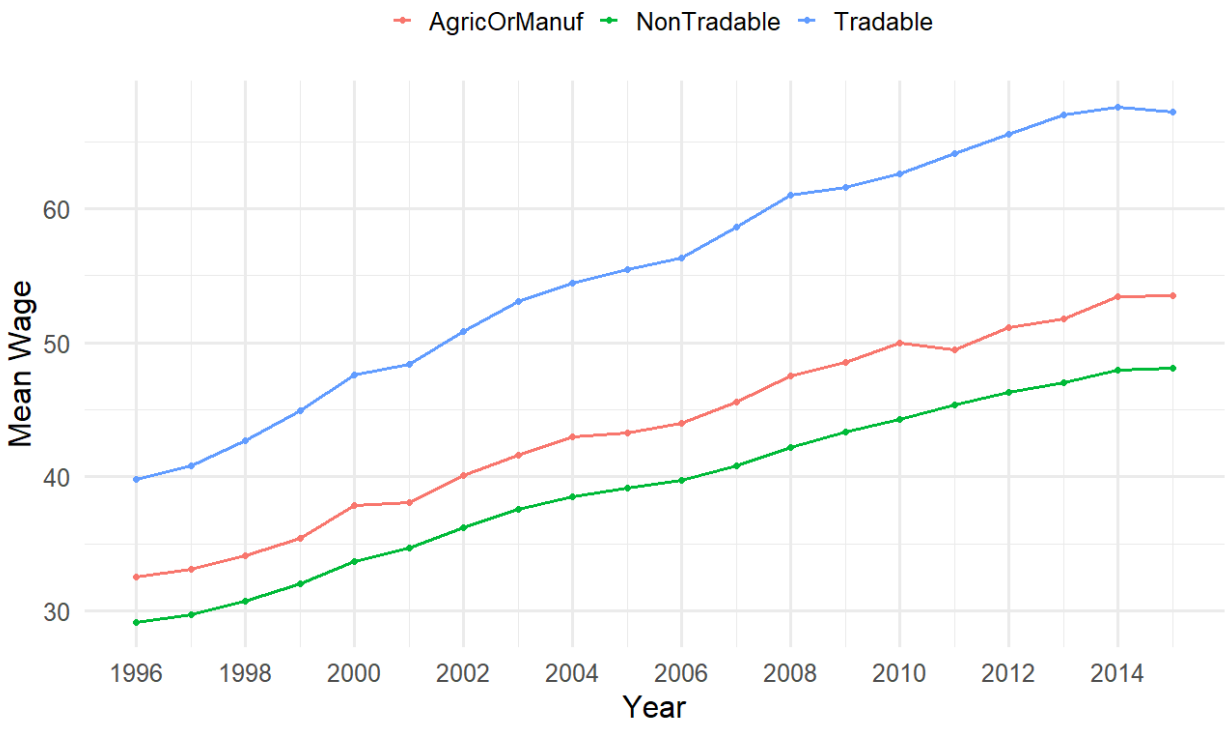


Figure A.2: The figure displays the time series of the mean monthly wages in Euros across jobs in sectors grouped by macro-category: Agriculture or Manufacturing, Non-Tradable Services, Tradable Services. Estimates are based on the LISA dataset.

Dependent Variables:	N-Units	Space	Space-per-Unit
	(1)	(2)	(3)
$I_{post} \times I_{VINEX}$	50.75***	4,252.0***	18.83***
	(2.841)	(380.3)	(6.560)
Fixed Effects			
Buurt	Yes	Yes	Yes
Municipality by Year	Yes	Yes	Yes
Observations	157,920	157,920	43,329
R^2	0.14354	0.08622	0.39760

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table A.1: The table displays estimates from the following regression specification:

$$y_{b,t} = D_{VINEX} \left(I_{post} \times I_{VINEX} \right) + a_b + a_{muni,t} + e_{b,t},$$

where $y_{b,t}$ is either the number of new units, new space (in square meters), the space-per-new unit (in square meters). I_{post} is a dummy equal to one for the year 1995 and following, and I_{VINEX} is a dummy equal to one for VINEX buurts; a_b are buurt fixed effects, and $a_{muni,t}$ are municipality by year fixed effects. The sample consists of all buurts in the Randstad region, over the period from 1984 to 2015. Standard errors are double-clustered by buurt and year and are reported in parenthesis.

Dependent Variables:	m_{in} 1995-2015 (1)	m_{in-out} 1995-2015 (2)	m_{in} 1995-2005 (3)	m_{in-out} 1995-2005 (4)
I_{VINEX}	0.1009***	0.1003***	0.1939***	0.1754***
	(0.0183)	(0.0140)	(0.0206)	(0.0144)
Fixed-effects				
Municipality by Year	Yes	Yes	Yes	Yes
Observations	87,908	85,263	45,073	43,631
R^2	0.16305	0.11061	0.19896	0.16091

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table A.2: The table displays estimates from the following regression specification:

$$m_{x,b,t} = M_{VINEX} I_{VINEX} + a_{muni,t} + e_{b,t},$$

where $m_{x,b,t}$ is either the ratio of people moving into buurt b in year t over total population (m_{in}), or the ratio of people moving in minus people moving out the following year over total population; I_{VINEX} is a dummy equal to one for VINEX buurts; $a_{muni,t}$ are municipality by year fixed effects. The sample consists of all buurts in the Randstad region. The period is from 1995 to 2015 in columns 1 and 2, and from 1995 to 2005 in columns 3 and 4. Standard errors are double-clustered by buurt and year and are reported in parenthesis.

	Full Sample (All non-VINEX Buurts) Dependent Variable: log($Price$)				
	(1)	(2)	(3) Above Med Income	(4) Below Med Income	(5)
$ShareVINEX \times I_{post}$	-0.0101***	-0.0051***	-0.0073***	-0.0024	-0.0023
	(0.0013)	(0.0006)	(0.0012)	(0.0025)	(0.0024)
$ShareVINEX \times I_{post} \times I_{HighInc}$					-0.0049
					(0.0031)
log(volume)	0.6258***	0.3257***	0.3729***	0.2798***	0.3246***
	(0.0794)	(0.0763)	(0.0793)	(0.0762)	(0.0765)
Additional Controls	No	Yes	Yes	Yes	Yes
Fixed-effects					
Buurt	Yes	Yes	Yes	Yes	Yes
Municipality by Year	Yes	Yes	Yes	Yes	No
Municipality by Year by $I_{HighIncome}$	No	No	No	No	Yes
Observations	1,049,255	1,049,255	510,543	527,552	1,038,095
R^2	0.80145	0.87624	0.88013	0.87376	0.87720

Table A.3: The table displays estimates of the spillovers of VINEX housing supply on house prices in non-VINEX buurts. Panel A reports estimates based on the full sample of non-VINEX buurts, while panel B reports estimates based on the subsample of buurts with high or zero exposure to VINEX. Columns 1 to 4 displays estimates from the specification:

$$log(p_{i,t}) = d_{ShVINEX}\left(ShareVINEX_i \times I_{post,i,t}\right) + AX_i + a_b + a_{muni,t} + e_{i,t},$$

where $log(p_{i,t})$ is the log sales price of property i in year t, $ShareVINEX$ is the share of VINEX land within a 5-Km radius of i's buurt centroid, I_{post} is a dummy equal to one after 1994, and a_b and $a_{muni,t}$ are buurt and municipality by year fixed effects. Column 5 displays estimates from the specification:

$$log(p_{i,t}) = g_{ShV,H}\left(ShareVINEX_i \times I_{post,i,t} \times I_{HighInc}\right) + g_{ShV}\left(ShareVINEX_i \times I_{post,i,t}\right) + FX_i + f_b + f_{muni,t,HI} + v_{i,t},$$

where $I_{HighInc}$ is a dummy equal to one in buurts that have average income per capita above the median in the municipality, and f_b and $f_{muni,t,HighInc}$ are buurt and municipality by year by above median income ($I_{HighInc}$) fixed effects

	Full Sample (All non-VINEX Buurts)			
	Dependent Variable: log($Price$)			
	(1)	(2)	(3)	(4)
			Above Med Income	Below Med Income
	OLS	2SLS	2SLS	2SLS
$\Delta log(\widehat{S}) \times I_{post}$		-0.0730***	-0.0988***	-0.0279
		(0.0117)	(0.0191)	(0.0373)
$\Delta log(S) \times I_{post}$	-0.0328**			
	(0.0131)			
log(volume)	0.3556***	0.3556***	0.3818***	0.3251***
	(0.0677)	(0.0677)	(0.0735)	(0.0635)
Additional Controls	Yes	Yes	Yes	Yes
Fixed Effects				
Buurt	Yes	Yes	Yes	Yes
Municipality by Year	Yes	Yes	Yes	Yes
Observations	783,978	783,978	391,398	389,664
R^2	0.88137	-	-	-

Table A.4: The table displays estimates of the inverse supply elasticity (elasticity of prices to new supply) in non-VINEX buurts. Panel A reports estimates based on the full sample of non-VINEX buurts, while panel B reports estimates based on the subsample of buurts with high or zero exposure to VINEX. Column 1 displays OLS estimates from the specification:

$$log(p_{i,t}) = \delta_S \left(\Delta log(S_{b(i),k}) \times I_{post,i,t}\right) + AX_i + a_b + a_{muni,t} + e_{i,t}$$

where $log(p_{i,t})$ is the log sales price of property i in year t, $\Delta log(S_{b(i),k}$ is the log change in new housing construction between before and after 1994 in the 5-Km radius surrounding buurt $b(i)$, in which property i is located, I_{post} is a dummy equal to one after 1994, and a_b and $a_{muni,t}$ are buurt and municipality by year fixed effects. Columns 2, 3, and 4 display 2SLS estimates, in which $\Delta log(S) \times I_{post}$ is instrumented using $ShareVINEX \times I_{post}$, where $ShareVINEX$ is the share of VINEX land within a 5-Km radius of i's buurt centroid.

Panel A: Sample Period 1995-2005						
Dependent Variables:	m_{out}^{VINEX}		m_{in-out}		m_{in}	
Model:	(1)	(2)	(3)	(4)	(5)	(6)
$ShareVINEX$	0.0008***	0.0008**	-3.73×10^{-5}	0.0001	-0.0001	0.0010
	(0.0002)	(0.0002)	(0.0003)	(0.0003)	(0.0008)	(0.0007)
$ShareVINEX \times I_{HighInc}$		2.58×10^{-5}		0.0002		-0.0017*
		(0.0002)		(0.0004)		(0.0008)
Fixed-effects						
Municipality by Year	Yes		Yes		Yes	
Municipality by Year by $I_{HighIncome}$		Yes		Yes		Yes
Observations	14,949	14,783	42,706	41,937	44,072	43,139
R^2	0.51411	0.54210	0.04905	0.08631	0.13600	0.17838

Panel B: Sample Period 1995-2015						
Dependent Variables:	m_{out}^{VINEX}		m_{in-out}		m_{in}	
	(1)	(2)	(3)	(4)	(5)	(6)
$ShareVINEX$	0.0006***	0.0006***	7.09×10^{-5}	0.0001	-0.0003	0.0008
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0007)	(0.0007)
$ShareVINEX \times I_{HighInc}$		-3.21×10^{-6}		0.0002		-0.0015
		(0.0001)		(0.0002)		(0.0009)
Fixed-effects						
Municipality by Year	Yes		Yes		Yes	
Municipality by Year by $I_{HighIncome}$		Yes		Yes		Yes
Observations	46,857	46,133	82,348	80,683	84,861	82,870
R^2	0.43350	0.46296	0.04540	0.07960	0.14793	0.18910

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table A.5: The table displays estimates of the effects of VINEX housing supply on mobility in non-VINEX buurts. The time period cover the years from 1995 to 2005. Panel A reports estimates based on the full sample of non-VINEX buurts, while panel B reports estimates based on the subsample of buurts with high or zero exposure to VINEX. Columns 1 and 3 to 5 display estimates from the specification, based on observations from 1996 and 2015 only:

$$m_{x,b,\tau} = M_{VINEX} ShareVINEX_b + n_{muni,\tau} + v_{b,\tau}$$

where $m_{x,b,\tau}$ is either the share of individuals moving to VINEX (m_{out}^{VINEX}), the difference between individuals moving in and out as a share of population (m_{in-out}), and the share of individuals moving in (m_{in}) in buurt b and year τ, $ShareVinex$ the share of VINEX land within a 5-Km radius of the buurt b, and $n_{muni,\tau}$ are municipality by year fixed effects. Columns 2, 4, and 6 display estimates from the specification:

$$m_{x,b,\tau} = M_{VINEX} ShareVINEX_b + M_{VINEX} \left(ShareVINEX_b \times I_{HighIncome,b}\right) + n_{muni,\tau} + v_{b,\tau}$$

where $I_{HighInc}$ is a dummy equal to one in buurts that have average income per capita above the median in the municipality, and $n_{muni,t,HighInc}$ are municipality by year by above median income ($I_{HighInc}$) fixed effects.

	Full Sample (All non-VINEX Buurts)				
	Dependent Variable: $NJobs$				
	(1)	(2)	(3)	(4)	(5)
		All	Agric./Manuf.	Non-Trad.	Trad.
$ShareVINEX \times I_{\tau=2015}$	0.0098	-0.0003	-0.0070	0.0002	0.0335***
	(0.0070)	(0.0080)	(0.0191)	(0.0101)	(0.0080)
$ShareVINEX \times I_{HighInc} \times I_{\tau=2015}$		0.0214***			
		(0.0067)			
Fixed-effects					
Buurt	Yes	Yes	Yes	Yes	Yes
Municipality by Year	Yes	No	Yes	Yes	Yes
Municipality by Year by $I_{HighIncome}$	No	Yes	No	No	No
Observations	10,614	9,906	9,650	10,517	10,357
Pseudo R^2	0.95589	0.95958	0.91830	0.95131	0.93403

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table A.6: The table displays estimates of the effects of VINEX housing supply on job growth in non-VINEX buurts. Panel A reports estimates based on the full sample of non-VINEX buurts, while panel B reports estimates based on the subsample of buurts with high or zero exposure to VINEX. Columns 1 and 3 to 7 displays estimates from the specification, based on observations from 1996 and 2015 only:

$$NJobs_{b,\tau} = \exp\left(g_{end}(ShareVINEX_i \times I_{\tau=2015}) + a_b + a_{muni,\tau} + u_{i,\tau}\right)$$

where $NJobs_{b,\tau}$ is either the total number of jobs (column 1), the total number of jobs in Agriculture or Manufacturing (column 3), Non-Tradable Services (column 4), Tradable Services (column 5), Non-Specialized sectors (column 6), and Specialized sectors (column 7) in buurt b and year τ, $ShareVinex$ the share of VINEX land within a 5-Km radius of the buurt b, $I_{\tau=2015}$ is a dummy equal to in 2015, and a_b and $a_{muni,\tau}$ are buurt and municipality by year fixed effects. Column 2 displays estimates from a specification:

$$NJobs_{b,\tau} = \exp\left(g_{end}(ShareVINEX_i \times I_{\tau=2015}) + g_{end,H}(ShareVINEX_i \times I_{HighInc} \times I_{\tau=2015}) + f_b + f_{muni,\tau} + v_{i,\tau}\right)$$

where $I_{HighInc}$ is a dummy equal to one in buurts that have average income per capita above the median in the municipality, and f_b and $f_{muni,t,HighInc}$ are buurt and municipality by year by above median income ($I_{HighInc}$) fixed effects.

SBI08 Level 2	Name (Dutch)	Name (English)	Sector (NACE)	Category
01	Landbouw	Agriculture	A	Agr. or Man.
02	Bosbouw	Forestry	A	Agr. or Man.
03	Visserij	Fishing	A	Agr. or Man.
06	B Delfstoffenwinning	Mining and quarrying	B	Agr. or Man.
08	B Delfstoffenwinning	Mining and quarrying	B	Agr. or Man.
09	B Delfstoffenwinning	Mining and quarrying	B	Agr. or Man.
10	Voedings-, genotmiddelenindustrie	Food and beverage industry	C	Agr. or Man.
11	Voedings-, genotmiddelenindustrie	Food and beverage industry	C	Agr. or Man.
12	Voedings-, genotmiddelenindustrie	Food and beverage industry	C	Agr. or Man.
13	Textiel-, kleding-, lederindustrie	Textile, clothing, and leather industry	C	Agr. or Man.
14	Textiel-, kleding-, lederindustrie	Textile, clothing, and leather industry	C	Agr. or Man.
15	Textiel-, kleding-, lederindustrie	Textile, clothing, and leather industry	C	Agr. or Man.
16	Houtindustrie	Wood industry	C	Agr. or Man.
17	Papierindustrie	Paper industry	C	Agr. or Man.
18	Grafische industrie	Graphic industry	C	Agr. or Man.
19	Aardolie-industrie	Petroleum industry	C	Agr. or Man.
20	Chemische industrie	Chemical industry	C	Agr. or Man.
21	Farmaceutische industrie	Pharmaceutical industry	C	Agr. or Man.
22	Rubber- en kunststofproductindustrie	Rubber and plastic products industry	C	Agr. or Man.
23	Bouwmaterialenindustrie	Building materials industry	C	Agr. or Man.
24	Basismetaalindustrie	Basic metal industry	C	Agr. or Man.
25	Metaalproductenindustrie	Metal products industry	C	Agr. or Man.
26	Elektrotechnische industrie	Electrical engineering industry	C	Agr. or Man.
27	Elektrische apparatenindustrie	Electrical appliances industry	C	Agr. or Man.
28	Machine-industrie	Machinery industry	C	Agr. or Man.
29	Auto- en aanhangwagenindustrie	Motor vehicle and trailer industry	C	Agr. or Man.
30	Overige transportmiddelenindustrie	Other transport equipment industry	C	Agr. or Man.
31	Meubel- en overige industrie	Furniture and other manufacturing	C	Agr. or Man.
32	Meubel- en overige industrie	Furniture and other manufacturing	C	Agr. or Man.
33	Reparatie en installatie van machines	Repair and installation of machinery	C	Agr. or Man.
35	Energiebedrijven	Energy companies	D	Agr. or Man.
36	Waterleidingbedrijven	Water supply companies	E	Non-Tr. Services
37	Riolering, afvalbeheer en sanering	Sewerage, waste, and remediation	E	Non-Tr. Services
38	Riolering, afvalbeheer en sanering	Sewerage, waste, and remediation	E	Non-Tr. Services
39	Riolering, afvalbeheer en sanering	Sewerage, waste, and remediation	E	Non-Tr. Services
41	Algemene bouw en projectontwikkeling	General construction and development	F	Tradable Services
42	Grond-, water- en wegenbouw	Civil eng. (ground, water, and roads)	F	Tr. Services
43	Gespecialiseerde bouw	Specialized construction	F	Tr. Services
45	Autohandel en -reparatie	Car trade and repair	G	Non-Tr. Services
46	Groothandel en handelsbemiddeling	Wholesale trade and brokerage	G	Non-Tr. Services
47	Detailhandel (niet in auto's)	Retail trade (excluding motor vehicles)	G	Non-Tr. Services
49	Vervoer over land	Land transport	H	Tr. Services
50	Vervoer over water	Water transport	H	Tr. Services
51	Vervoer door de lucht	Air transport	H	Tr. Services
52	Opslag, dienstverlening voor vervoer	Storage and transport services	H	Tr. Services
53	Post en koeriers	Postal and courier services	H	Tr. Services
55	I Horeca	Hospitality	I	Non-Tr. Services
56	I Horeca	Hospitality	I	Non-Tr. Services
58	Uitgeverijen	Publishing	J	Tr. Services
59	Film, TV en radio	Film, TV, and radio	J	Tr. Services
60	Film, TV en radio	Film, TV, and radio	J	Tr. Services
61	Telecommunicatie	Telecommunications	J	Tr. Services
62	IT- en informatiedienstverlening	IT and information services	J	Tr. Services
63	IT- en informatiedienstverlening	IT and information services	J	Tr. Services
64	Bankwezen	Banking	K	Tr. Services
65	Verzekeraars en pensioenfondsen	Insurance and pension funds	K	Tr. Services
66	Overige financiÃ«le dienstverlening	Other financial services	K	Tr. Services
68	Verhuur en handel van onroerend goed	Real estate rental and trade	L	Tr. Services
69	Juridisch en managementadvies	Legal and management consultancy	M	Tr. Services
70	Juridisch en managementadvies	Legal and management consultancy	M	Tr. Services
71	Architecten-, ingenieursbureaus e.d.	Architectural and engineering firms	M	Tr. Services
72	Research	Research	M	Tr. Services
73	Reclamewezen en marktonderzoek	Advertising and market research	M	Tr. Services
74	Overige professionele diensten	Other professional services	M	Tr. Services
75	Overige professionele diensten	Other professional services	M	Tr. Services
77	Verhuur van roerende goederen	Rental of movable property	N	Non-Tr. Services
78	Uitzendbureaus en arbeidsbemiddeling	Employment agencies and mediation	N	Non-Tr. Services
79	Reisbureaus, reisorganisatie en -info	Travel agencies, tour operators, and info	N	Non-Tr. Services
80	Overige zakelijke dienstverlening	Other business services	N	Non-Tr. Services
81	Overige zakelijke dienstverlening	Other business services	N	Non-Tr. Services
82	Overige zakelijke dienstverlening	Other business services	N	Non-Tr. Services
84	Openbaar bestuur en overheidsdiensten	Public administration and government	O	Non-Tr. Services
85	Onderwijs	Education	P	Non-Tr. Services
86	Gezondheidszorg	Health care	Q	Non-Tr. Services
87	Verzorging en welzijn	Care and welfare services	Q	Non-Tr. Services
88	Verzorging en welzijn	Care and welfare services	Q	Non-Tr. Services
90	Kunst, cultuur en kansspelen	Arts, culture, and gambling	R	Non-Tr. Services
91	Kunst, cultuur en kansspelen	Arts, culture, and gambling	R	Non-Tr. Services
92	Kunst, cultuur en kansspelen	Arts, culture, and gambling	R	Non-Tr. Services
93	Sport en recreatie	Sports and recreation	R	Non-Tr. Services
94	Ideele, belangen-, hobbyverenigingen	Non-profit, advocacy, and hobbies	S	Non-Tr. Services
95	Reparatie van consumentenartikelen	Repair of consumer goods	S	Non-Tr. Services
96	Overige persoonlijke dienstverlening	Other personal services	S	Non-Tr. Services

Table A.7: Mapping of SBI 2008 codes from the LISA data into sectors (based on the NACE Eurostat classification), and macro-categories (Argiculture or Manufacturing, Non-Tradable Services, Tradable Services).