Can Tax Breaks Beat Geography? Lessons from the French Enterprise Zone Experience*

Anthony Briant† Miren Lafourcade‡ Benoît Schmutz§

This version:
May 16, 2012

Abstract

This paper shows that geography matters to the effectiveness of place-based policies, using the French enterprise zone program as a case study. We build a series of original indicators of spatial isolation for treated and non treated neighborhoods. We show that only the least isolated treated neighborhoods were able to draw benefits from tax breaks and social exemptions, both in terms of firms settlements and job creations. Moreover, whereas the program mostly worked through a displacement effect on pre-existing firms, we show that urban geography was a clear determinant of the decision to create new firms from scratch.

JEL codes: H250, R340, R380, R580.

Keywords: Enterprise zones, spatial isolation, transportation accessibility, urban severance.

*This research was partly funded by the Direction de l'Animation de la Recherche, des Etudes et des Statistiques (DARES) and the Secrétariat Général du Comité Interministériel des Villes (SG-CIV). We thank discussants from these two institutions, especially Dominique Goux, Françoise Maurel and Patrick Sillard. We are also very grateful to the participants to the 58th Annual North American Meetings of the Regional Science Association International (Miami, 2011) and to seminars at CREST, University of Paris-Sud, GREQAM and PSE, and especially to Pierre-Philippe Combes, Matthew Freedman, Xavier d'Haultfœuille, José de Sousa and Tanguy van Ypersele for insightful comments. The access to the ENTD data was carried out through the CASD dedicated to researchers authorized by the French "Comité du secret statistique".

†Paris School of Economics (PSE); Anthony.Briant@m4x.org.

‡University Paris-Sud (ADIS) and Paris School of Economics (PSE); lafourcade@pse.ens.fr; http://www.parisschoolofeconomics.com/lafourcade-miren/.

§University Paris-Sud (ADIS), CREST and Paris School of Economics (PSE); benoit.schmutz@gmail.com; http://sites.google.com/site/benoitschmutz/.

1 Introduction

The evaluation of enterprise zone programs has generated a lot of research over the past two decades, with conflicting conclusions regarding their effectiveness.[1] However, the reasons why some programs have worked somewhere while other apparently similar programs have failed elsewhere is seldom investigated (Bartik (2004)). In this paper, we argue that one important component of this heterogeneity is urban geography: the location of targeted neighborhoods within metropolitan areas, which ultimately determines the ease at which people circulate into and out of those neighborhoods, does matter to reap benefits from enterprise zone programs. At the intra-urban scale, the location of a neighborhood may not be well proxied by a mere combination of relative distance and population. It also depends on access to transportation infrastructure as well as on physical elements which create urban severance -natural obstacles, industrial wastelands or even, paradoxically, large transportation infrastructures such as highways or airports which are often irrelevant to local residents and local firms. As emphasized by Button (2010):

> "Roads, railways, canals and other transport arteries often present major physical (and sometimes psychological) barriers to human contact. An urban motorway can cut a local community in two, inhibiting the retention of long-established social ties and, on occasion, making it difficult for people to benefit from recreational and employment opportunities on the other side of the barrier. A rail line can do the same." (op. cit., p.186)

Whereas people-based programs are increasingly believed to dominate place-based programs on a whole range of criteria (Glaeser and Gottlieb (2008)), they cannot be used to address large-scale social exclusion in the poorest neighborhoods. Therefore, if place-based programs such as enterprise zones are also shown to be inefficient, there is room for concern. For this reason, understanding why enterprise zone programs work in some places and not others is crucial to crafting effective place-based policies. It can help establish criteria for zone qualification and for determining what types of incentives to offer and to whom. Finally, this question also relates to the issues of transferability and scalability of this kind of programs, which may turn out to be pretty low if geography, which is not easily modified in the short run, is an important determinant of the overall effectiveness of the program.

The first evaluations of the French "Zones Franches Urbaines" program (ZFU hereafter) did not yield very optimistic conclusions, since they either only found a small positive impact on firm and job creation rates, but only for the first year of the program (Rathelot and Sillard (2009)), or no impact at all on unemployment duration (Gobillon, Magnac, and Selod (2010)). In their conclusion, Rathelot and Sillard (2009) claim that such a weak effect may be partly due

[1] Among others, Bondonio and Engberg (2000) and Neumark and Kolko (2010) find no sizeable effects of enterprise zones on employment, whereas Papke (2004), O'Keefe (2004) and Ham, Swenson, Imrohoroglu, and Song (2011) do find a positive impact on various social and economic outcomes. As shown by Bondonio and Greenbaum (2007), the null average impact of enterprize zone programs might hide complex dynamics related to firms creation and destruction.

to the large spatial heterogeneity in the effectiveness of the program between ZFU. This paper aims at recovering part of this unexplained heterogeneity by comparing the geographical characteristics of the ZFUs, and in particular, their level of isolation with respect to the rest of the metropolitan area. The impact of physical obstacles on the functioning of the city has long been acknowledged by urban planners and geographers. For instance, as early as 1961, Jane Jacobs started pointing out that monofunctional enclaves and large transportation infrastructures were increasingly leading to a new form of city-carving and posed a threat to urban cohesion, in particular if the neighborhoods were small and not diversified enough (Jacobs (1961)). Five decades later, however, the quantitative research on this matter is still sparse because the measure of urban severance remains an empirical challenge, compounded by the ambiguous role of transportation infrastructures and the necessity to take the mobility of residents into account. As noted by Handy (2003), "whether transportation facilities will serve as borders, barriers, or gathering spots depends in part on how residents perceive and react to these facilities". Similarly, Button (2010) explains that the best indicator of urban severance would include a measure of the number of suppressed trips induced by the obstacles, which requires the use of subjective individual surveys and is more in line with a monographic approach of the question. The same difficulties are observed in a recent French work, for which an accurate case-by-case cartography of urban severance remains the endpoint of the analysis (Héran (2011)).

As far as we are concerned, we believe that there is enough good-quality information available to document urban isolation in a systematic fashion, for very different neighborhoods all across France, and to establish meaningful statistical relationships out of such indicators. For this purpose, we perform a Geographical Information System (GIS hereafter) analysis on a topographical map of France to construct a series of indicators which account for spatial isolation. For instance, we compute an index of the road severance preventing the inhabitants, the employees and the firms of a neighborhood from acceding easily to the closest Central Business Districts of their metropolitan area. These indicators of spatial isolation enable us to precisely document the level of geographical heterogeneity within the set of French neighborhoods that benefit from the ZFU program. We show that geographical heterogeneity can contribute to explain why the average impact of the program is weak and may help reconcile conflicting results from previous studies.

We estimate a series of augmented difference-in-differences models in which we compare the treated ZFU to a control group formed by similar areas that filled all the eligibility criteria but were not selected into the program. This method is one of the strategies proposed by Rathelot and Sillard (2009). To understand the differentiating role of geography, we interact the treatment indicator with our different indicators of spatial isolation. Our estimates, which can be interpreted as in a triple-difference framework, indicate that spatial isolation does matter to explain spatial differentials in job and establishment creation or transfer rates across enterprise zones. For instance, at the end of 2004, the first year of the program implementation, the establishment settlement growth rate in the areas selected to become ZFU was 17% points above the establishment settlement growth rate in the unselected similar areas. Among the selected ZFUs, the least spatially isolated over-performed: for example, a decrease by one standard deviation in the number of expressways separating the ZFU from the main center of the urban area translated into an additional 7% increase in the establishment settlement rate.

We also examine whether the ZFU program effectiveness differs across production sectors in the neighborhood. Previous work, such as Freedman (2012), have indeed put the emphasis on the fact that the somehow modest positive effect of enterprise zones programs was triggered by the low and middle-paying jobs created in the goods-producing, retail, and wholesale trade industries. A sectoral analysis is called for here in order to study whether economic activities that do not really require to be operated within the zone, because they are intrinsically mobile and/or because they are labor-intensive, are sensitive to the level of spatial isolation of the neighborhoods: in the French situation, this is notably the case of the medical sector, which is largely conducted out of the zone and tends to benefit more from the program, on average, than heavy or manufacturing industries.

The rest of the paper is organized as follows: Section 2 presents the ZFU program and the different geographical indicators that we propose to measure spatial isolation at the neighborhood level; Section 3 presents our empirical strategy to evaluate the effectiveness of the ZFU program on different economic variables and the role played by spatial isolation in this respect; in Section 4, we present and discuss our results, while Section 5 concludes.

2 The geography of ZFU

The ZFU program was initiated in 1996 as part of a large policy labelled the "Pacte de Relance de la Ville" (Urban Revival Pact), which aimed at generating economic revival within French distressed urban areas. The ZFU constitute the ultimate level of a three-tier zoning system of deprived neighborhoods: the first-tier level, composed of 751 Urban Sensitive Zones ("Zones Urbaines Sensibles" or ZUS) was initially formed by urban neighborhoods with a derelict housing stock and a low job-to-resident ratio. Among them, 416 Urban Revitalization Zones ("Zones de Revitalisation Urbaines" or ZRU) were more carefully targeted. Finally, the 44 ZRU that seemed to be the most underprivileged were declared ZFU (subsequently, these would be known as the first-generation of ZFU or ZFU 1G). Firms which entered a ZRU or a ZFU could benefit from various tax breaks and other social exemptions. However, the generosity of these rebates was much higher in ZFU (for details, see Appendix B and Givord, Rathelot, and Sillard (2011)). Moreover, whereas these rebates were designed to be limited in time, they were postponed in practice, so that all ZFU were still active in 2012.

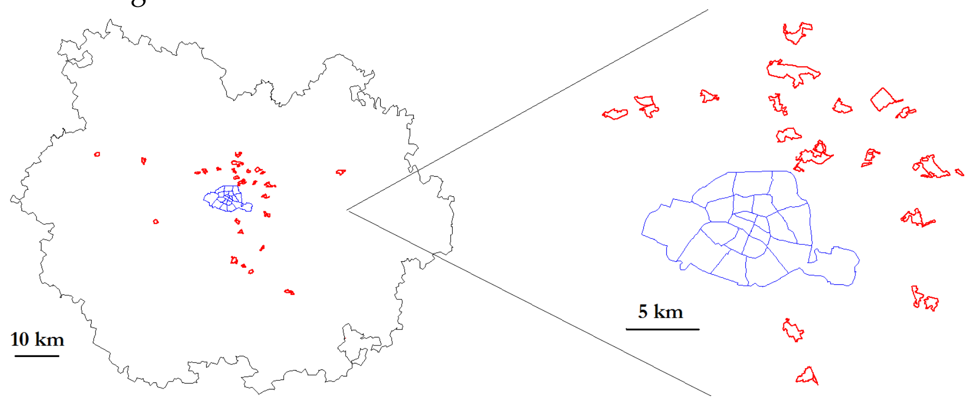
A second wave of 41 ZFU (hereafter, ZFU 2G) was created in 2004, out of the stock of ZRU that had not been designated ZFU 1G. The selection of these new zones was supposed to stem from their respective ranking according to a synthetic index aggregating the total population of the area, the unemployment rate, the proportion of residents with no qualification, the proportion of residents under the age of 25, and the tax potential of the hosting municipality.[2] Moreover, the new ZFU had to have more than 10,000 inhabitants. However, this criterion appeared

[2]The tax potential is defined as a theoretical product of local taxes for the municipality in case the average national rate were applied to the municipality for each of the local rates.

to be dominated by the political desire to achieve a more even scattering of the ZFU across France. Indeed, Givord, Rathelot, and Sillard (2011) show that ZFU 2G did not always match the most deprived areas: they had on average a smaller share of dropouts than the other not-designated ZRU, as well as a lower unemployment rate. They looked even better off in terms of the financial capacity of municipalities. In the sense that political considerations came into play, the selection of the ZFU 2G was close to random, which makes the difference-in-differences approach particularly justified. This is why, in the rest of the paper, we choose to focus on the evaluation of this second wave only.

Finally, while the program had never really been evaluated, 15 new ZFU were added in 2006 (ZFU 3G). By that time, the annual cost of the program reached half a billion euros. The final current 100 ZFU represent 1.5 million inhabitants (against 4.4 in ZUS, and 2.9 in ZRU), and they are mostly located in large metropolitan areas, as shown in Figure 7 (Appendix A). All ZFU without exception are part of an urban area:[3] 25 are located within the Parisian urban area and 9 more are located in the next three largest urban areas (4 in Lyon, 2 in Marseilles and 3 in Lille). With a quarter of all ZFU, the Paris region is peculiar. Figure 1 shows that ZFU around Paris are quite diverse in terms of size and shape, and that most of them are located within a 20-km radius around the city of Paris (which is about 15km long from east to west).

Figure 1: The location of the 25 ZFU in the Paris urban area



Note: (i) the black line represents the border of Paris urban area; the blue lines are the borders of the 20 districts of the city of Paris; the red lines are the borders of the 25 ZFU located in the Paris urban area; (ii) *Source*: GIS SG-CIV.

2.1 Measuring spatial isolation

The level of spatial isolation of a neighborhood within an urban area may be determined by a combination of three features: centrality, accessibility and continuity of the urban landscape. Centrality is a measure of the relative position of the neighborhood with respect to the other locations of the urban area. Accessibility depends on the access to the transportation network or nodes connecting the neighborhood to these locations. As for continuity, it can be characterized

[3]The French "Aires Urbaines" (urban areas or UA) are defined around a city-pole with more than 5,000 jobs and a group of surrounding municipalities polarized around this pole, in which at least 40% of the UA workforce is employed.

in reference to the number and the magnitude of the urban cut-offs which physically isolate the neighborhood from the surrounding locations and generate an urban enclave.

To measure these three spatial dimensions, we make use of the 2006 version of a topographical database called BD TOPO®, developed by the French National Geographical Institute, which summarizes all the landscape elements of the French territory, at a metric accuracy, in particular public infrastructures and their building footprint (such as for example universities, hospitals or city-halls), relief, hydrography and vegetation. We focus, although not exclusively, on the transportation network, which is described very precisely[4] and where infrastructures are ranked according to different characteristics. For example, there are six different levels of roads, which depend on the intensity of traffic, with a variable indicating whether each of these roads has two separate lanes, in which case it can be considered as impassable. The geographical referential upon which these series of maps are drawn is the same as the one used by policy-makers who design ZFU (Lambert93). For this reason, the borders of ZFU are perfectly identified with respect to all the information of the BD TOPO®.

2.1.1 Centrality and accessibility

We first compute different indicators of the ZFU transportation accessibility. The most simple indicators are given by the smallest distance between the ZFU border and various transportation nodes, such as highways junctions, train or metro stations,[5] or transportation facilities, such as parking lots. We measure transportation accessibility in two ways. The first is to count the number of transportation nodes in the vicinity of a ZFU and the second, to measure the fraction of the ZFU which is in the vicinity of such nodes. Figure 2 provides an example extracted from our GIS analysis of a ZFU in Lille, in the north of France. In the left-hand-side map, each circle intersecting with the red line indicates one train or metro station which is less than 500 meters away from the ZFU. In the right-hand-side map, the grey area indicates the part of the ZFU which is less than 500 meters away from a metro station, which corresponds in our example to 33% of the ZFU.

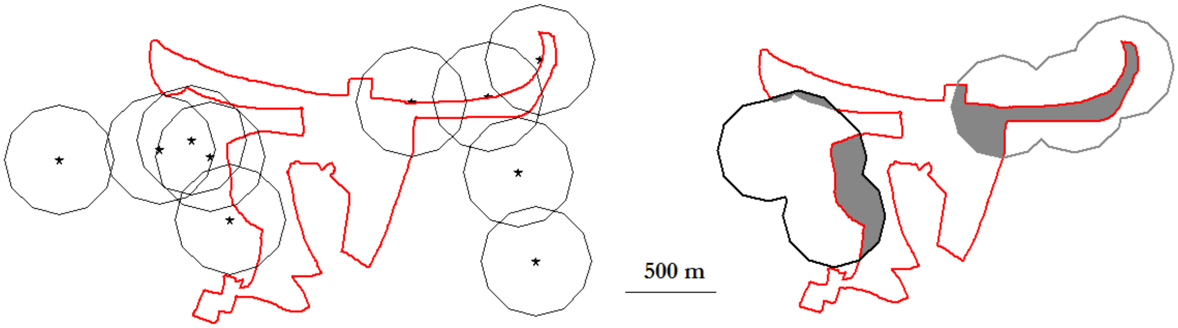
Since these different indicators describe very local situations, one may also want to take into account the broader location of the ZFU within the urban area, to account for the centrality dimension. Henceforth, we also build an indicator that gives a kind of "market potential" of the ZFU, based on its distance to all municipalities within the urban area (Harris (1954)). For any transportation variable x, we compute two alternative measures of market potential, depending on whether we exclude the municipality in which the ZFU is located, in order to mitigate possible endogeneity issues. For each ZFU located in municipality k in urban area "UA", the formulas are given by:

$$MP_{ZFU}(x) = \frac{\sum\limits_{k' \in UA} \frac{x_{k'}}{dist_{ik'}}}{\sum\limits_{k' \in UA} x_{k'}} \qquad \text{or} \qquad MPs_{ZFU}(x) = \frac{\sum\limits_{k' \neq k, \in UA} \frac{x_{k'}}{dist_{ik'}}}{\sum\limits_{k' \neq k \in UA} x_{k'}}, \tag{1}$$

[4]We can locate harbors, airports, bridges, highway junctions, traffic circles, cable cars and, most importantly for our purpose, train and metro stations.

[5]Unfortunately, the BD TOPO® database does not provide information on bus stations and lines.

Figure 2: The accessibility of a ZFU to train or metro stations



Notes: (i) ZFU #31041ZF: "Faubourg de Béthune-Moulin-Lille Sud-L'Epi de Soil" in Lille; (ii) the red line is the border of the ZFU; black stars are the train or metro stations and black circles form a 500m perimeter around each station; (iii) the grey is the part of the ZFU which is less than 500m away from a train or a metro station; (iv) *Source*: GIS SG-CIV and BD-TOPO®.

where $(k')_{k'=1,\ldots,K}$ are the municipalities which belong to the urban area and $dist_{(ZFU;k')}$ is the distance between the centroid of the ZFU and the centroid of municipality k'. The market potential is divided by the total sum of x in the UA in order to mitigate the impact of the largest areas, in particular the Paris region. Variable x can be either the number of train / metro stations or the length of the road network. Road length may or may not be weighted according to the magnitude of traffic documented in the BD-TOPO®.[6]

Finally, we also compute more standard measures of accessibility and centrality, such as the distance of the ZFU to the Central Business District (CBD, hereafter) of the urban area. We use the term "CBD" to refer to a municipality hosting more than 50% of either the UA population or the population of the largest inhabited municipality in the UA. Small urban areas generally have one CBD only, whereas the largest urban areas may have several CBDs. For example, as depicted in Figure 1, the Paris urban area has 20 CBDs which correspond to the 20 parisian well-known districts. In case of multiple CBDs, we define the main CBD as the most populated municipality in the UA and compute two alternative measures of distance to CBD: either the distance to the main CBD or the average distance to all CBDs in the urban area, which is the sum of the distance of the ZFU to each CBD, weighted by the share of this CBD in the total population of CBDs in the urban area. We also compute the average distance of the ZFU to all municipalities in the UA (weights are then the share of the municipality observed in the UA population). Finally, we complement these distance indicators with traditional market potentials. The market potential with respect to population gives the sum of the share of each municipality in the UA population, discounted by the distance between the municipality and the ZFU.

2.1.2 Urban severance

In order to measure how separated the ZFU are from the other parts of the urban area, we build two types of indicators related to urban severance. The first type is the number of cut-offs that separate the ZFU from the main CBD of the urban area. We isolate rivers, railroads or roads and for the latter, we alternatively consider all impassable roads, or only roads with the

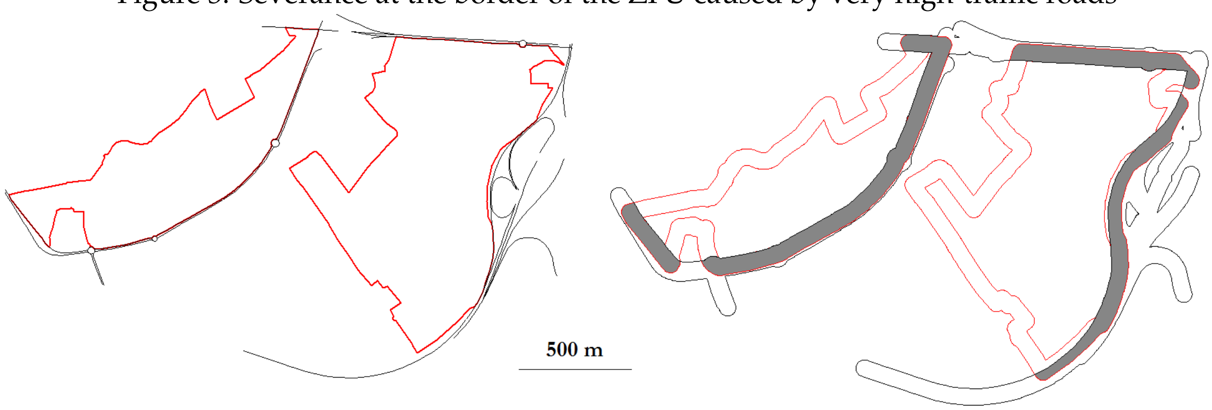
[6] In which case, the weights used go from 6 for highways and simili-highways to 1 for small country roads and tracks.

highest traffic. For urban areas with several CBDs, we compute the average number of obstacles between the ZFU and each CBD, weighted or not by the share of the CBD in the total population of CBDs.

The second type of indicator aims at taking into account the fact that some ZFU borders may literally follow main traffic arteries, which isolate them from the rest of the agglomeration because they cannot be crossed easily by pedestrians. To account for these "traffic barriers", we draw 100 meter-wide buffers around the railroads and roads located in the vicinity of a ZFU, and we measure the fraction of a 100 meter-wide buffer around the ZFU border which intersects with these road buffers. These indicators are built using more exclusive or inclusive definitions of roads. We consider three types of roads: expressways (which correspond to the sixth and fifth classes in BD-TOPO®), big roads (fourth to sixth class) and busy roads (third to sixth class).

The two maps in Figure 3 describe how it is done for a ZFU in Évreux (West of Paris), for expressways, which form 46% of the ZFU border, according to our analysis.

Figure 3: Severance at the border of the ZFU caused by very high-traffic roads



Notes: (i) ZFU #2315NZF: "La Madeleine" in Évreux; (ii) left: the red line is the border of the ZFU; black lines are expressways; (iii) right: the red line is the border of a 100m-wide buffer-zone centered on the ZFU border; the black line is the border of a 100m-wide buffer-zone centered on the whole set of expressways; the grey area is the fraction of the ZFU buffer which intersects with the road buffer; (iv) *Source*: GIS SG-CIV and BD-TOPO®.

2.2 The geographical patterns of ZFU: stylized evidence

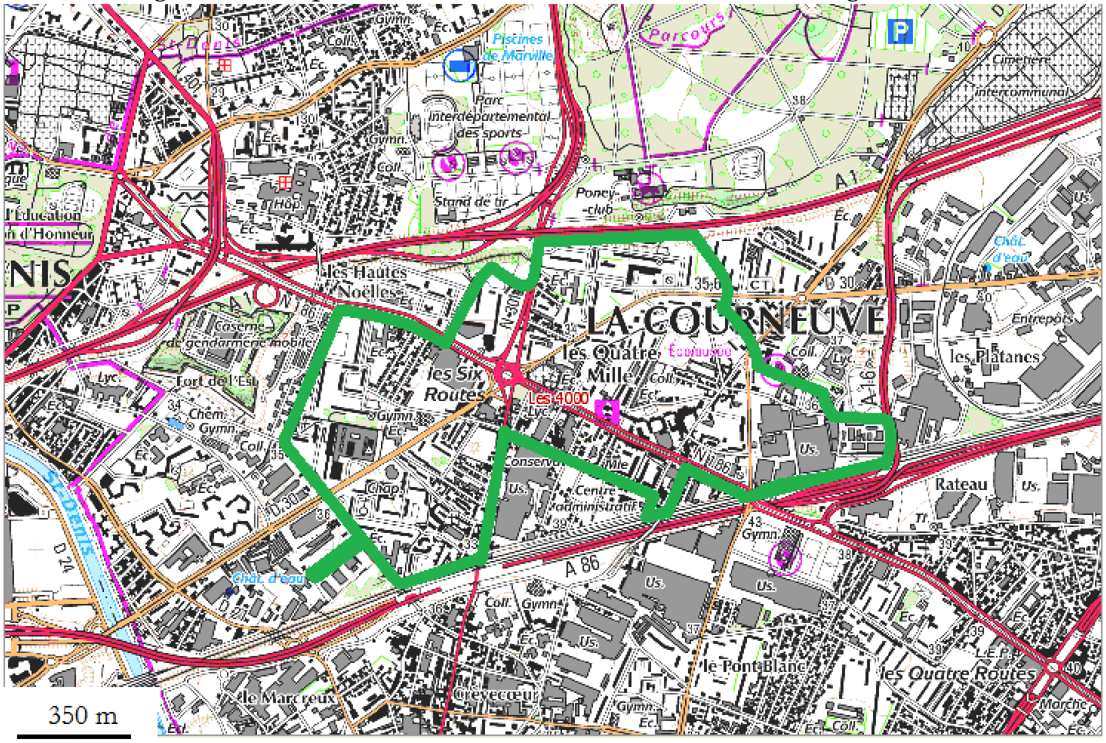
Even though they share common characteristics, both in terms of large-scale location and landscape, the neighborhoods that became the 93 ZFU of continental France are quite diverse with respect to their spatial relationship to their surroundings. For the whole set of indicators, Table 1 describes this diversity and also gives two polar examples of ZFU: "les 4000", located in a notorious northern suburb of Paris called "La Courneuve", and "Bourges Nord" located in the Northern part of Bourges, a city of less than 80,000 inhabitants in the center of France. As shown on the maps of these two ZFU, displayed in Figure 4, "Les 4000" is much more isolated from the rest of its urban area than "Bourges-Nord", both in terms of simple distance to the CBD (Paris), and because of the numerous cut-offs that can be observed all around the border of the neighborhood. On the other hand, les 4000 has better access to all kinds of transportation networks than Bourges-Nord, which belongs to a small urban area with little public transportation infrastructure.

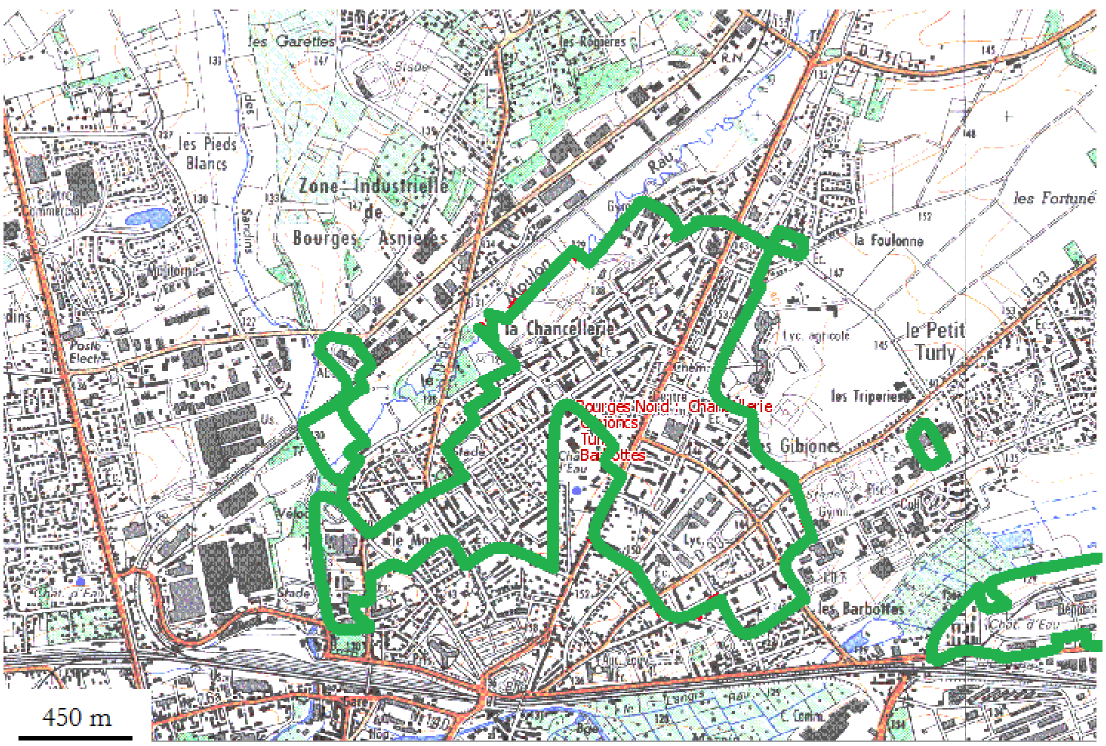
Table 1: The geographical features of ZFU

	Min	Max	Average	Std Dev.	Les 4000	B. Nord
Severance						
Urban cut-offs between the neighborhood and the CBDs						
River cut-offs to main CBD in the UA	0	500	34.871	90.261	50	2
River cut-offs per CBD in the UA	0	486.463	34.906	82.649	57.5	2
Average river cut-offs to all CBDs in the UA	0	481.25	34.534	81.675	56.127	2
Railroad cut-offs to main CBD in the UA	0	50	8.022	10.582	13	2
Railroad cut-offs per CBD in the UA	0	38.560	8.752	10.455	22.3	2
Average railroad cut-offs to all CBDs in the UA	0	38.15	8.579	10.232	22.488	2
Expressway cut-offs to main CBD in the UA	0	48	7.785	9.804	11	3
Expressway cut-offs per CBD in the UA	0	40.067	7.574	8.852	12.8	3
Average expressway cut-offs to all CBDs in the UA	0	40.85	7.464	8.693	13.982	3
Impassable roads cut-offs to main CBD in the UA	0	51	8.484	10.332	10	3
Impassable roads cut-offs per CBD in the UA	0	72.891	8.546	9.257	12.25	3
Average impassable road cut-offs to all CBDs in the UA	0	41.7	8.459	9.140	12.587	3
Severance at the border						
Road severance at the border (busy roads)	0.197	0.913	0.500	0.155	0.609	0.324
Road severance at the border (big roads)	0	0.749	0.268	0.149	0.508	0.138
Road severance at the border (expressways)	0	0.498	0.137	0.122	0.438	0.102
Road severance at the border (impassable roads)	0	0.504	0.173	0.114	0.370	0.030
Road severance at the border (railroads)	0	0.325	0.092	0.093	0.269	0.038
Accessibility						
Distance to transportation						
Distance to closest rail or metro station	0	2.816	0.739	0.733	0	0.234
Distance to closest highway junction	0	71.712	11.349	14.868	11.012	45.130
Distance to closest airport	0.227	92.675	21.904	22.728	3.409	4.275
Distance to closest international airport	0.476	164.313	36.712	33.456	4.769	57.203
Catchment area						
Number of parking lots less than 500m away from ZFU	0	49	12.957	9.800	6	1
% ZFU less than 500m away from station	0	0.874	0.123	0.216	0.651	0.022
Number of stations less than 500m away from ZFU	0	10	1.355	2.353	4	1
Centrality						
Market potentials						
Population access in the UA	0.027	0.848	0.219	0.167	0.088	0.257
id. without the ZFU municipality in the UA	0.022	0.242	0.091	0.046	0.085	0.055
Road access in the UA	0.026	0.517	0.129	0.091	0.046	0.121
id. without the ZFU municipality	0.024	0.215	0.082	0.038	0.044	0.078
Road access (weighted by traffic) in the UA	0.026	0.547	0.131	0.094	0.050	0.126
id. without the ZFU municipality	0.024	0.205	0.084	0.038	0.046	0.078
Passenger station access in the UA	0.025	0.995	0.188	0.170	0.097	0.206
id. without the ZFU municipality	0	0.284	0.083	0.051	0.089	0.0091
Distance to CBD						
Distance to main CBD	0.822	47.911	8.379	9.778	11.944	2.894
Average distance to all CBDs in the UA	0.822	50.743	8.241	9.554	8.809	2.894
Average distance to all municipalities in the UA	2.008	53.062	13.307	10.145	20.190	2.894

Notes: (i) The observations are the 93 ZFU in continental France; (ii) For each infrastructure, the first cut-off variable is the number of cut-offs between the ZFU and the main CBD of the urban area; the second cut-off variable is the number of cut-offs between the ZFU and each CBD of the urban area, divided by the number of CBDs; and the last cut-off variable is similar, except that each cut-off is weighted by the share of the corresponding CBD in the total population of CBDs in the urban area; (iii) Road severance is the proportion of the border of the ZFU that is within 100m of a transportation artery; (iv) Population, road and passenger station accesses are market potential variables where the variable x in equation (1) is, respectively, population, length of roads and number of train and metro stations; (v) Distances are in km; Average distances are weighted by population; (vi) *Source*: GIS SG-CIV and BD-TOPO®.

Figure 4: Two polar cases of ZFU: “Les 4000” and “Bourges-Nord”





Notes: (i) top: map of “Les 4000” (ZFU #1119NZF) in the Parisian suburb of “La Courneuve”; bottom: map of “Bourges-Nord” (#24010ZF) in the city of Bourges; (ii) The thick green lines are the borders of both ZFU, the purple lines in La Courneuve are highways, whereas the orange lines in Bourges are busy roads; (iii) Bourges-Nord is made of several separate pieces; (iv) *Source*: www.sig.ville.gouv.fr

2.3 Spatial isolation and residents' mobility: indirect evidence

The lack of mobility of the residents in deprived urban areas has long been acknowledged as a compounding factor for their social integration (Coulson, Laing, and Wang (2001); Patacchini and Zenou (2007); Zenou (2002)). We use a National Survey on Mobility, the "Enquête Nationale Transports et Déplacements" (henceforth ENTD) for 2007-2008 to briefly document the following two features: first, that ZUS residents are, indeed, less mobile on average, especially unemployed ZUS residents; second, that even among deprived areas located in ZRU and ZFU, spatial isolation, as measured by our indicators, can account for part of the variations in observed mobility patterns. For that purpose, we use one indicator of the lack of mobility: the number of days when the respondent did not leave home during the week before the ENTD survey.

Table 2 displays the regression results from an ordinary-least-square regression of the number of days at home on a dummy variable indicating whether the respondent lives in ZUS, his/her employment status and the interaction between the two. It shows no difference between ZUS and non-ZUS for employed residents. However, unemployed respondents stay on average half a day more at home and unemployed residents in ZUS stay one additional day at home. Given the sample average is 0.6 day, these estimates are very large, and they are robust to the control by qualifications as well as UA fixed effects.

Table 2: Number of days without leaving home

VARIABLES	(1)	(2)	(3)
ZUS resident	0.001	-0.09	-0.04
	(0.08)	(0.09)	(0.08)
Unemployed	0.56***	0.49***	0.51***
	(0.11)	(0.12)	(0.12)
Unemployed ZUS resident	1.01***	1.06***	0.82***
	(0.33)	(0.33)	(0.31)
Diploma dummies	No	Yes	Yes
UA fixed effects	No	No	Yes
R-Squared	0.05	0.07	0.17

Notes: (i) Ordinary-least-square estimates; Robust standard deviations in parentheses: ***p<0.01, **p<0.05, *p<0.1; (ii) Sample: random draw of one individual by household, N = 4954; (iii) Regressions are weighted by sampling weights; (iv) *Source*: ENTD 2007-2008.

Whereas ZUS residents as a whole are less mobile than the rest of the population, it is also possible to show that those respondents located in ZRU or ZFU are even less mobile when their neighborhood is more spatially isolated. Table 3 displays the estimation results from an ordinary-least-square regression of this number of days on the indicator described in line, employment status and the interaction of the two. For instance, if the road access goes from 0 to 1, it is associated with more than a two-day decrease in the number of days spent at home by unemployed respondents.

These correlations, which are robust to the control for urban area fixed effects, show that our indicators of spatial isolation precisely measure individual mobility.

Table 3: The impact of geographical indicators on the number of days without leaving home

Residents of ZRU/ZFU	Without UA fixed effects Unemp.	Indic.	Unemp. × Indic.	With UA fixed effects Unemp.	Indic.	Unemp. × Indic.
Severance						
River cut-offs to main CBD in the UA	0.81**	-0.02**	0.03*	0.66**	-0.01	0.04**
	(0.34)	(0.01)	(0.02)	(0.30)	(0.02)	(0.02)
Average impassable road cut-offs to all CBDs in the UA	0.82*	-0.01	0.01	0.62**	0.03	0.01
	(0.43)	(0.01)	(0.03)	(0.36)	(0.01)	(0.02)
Road severance at the border (expressways)	0.70*	0.10	1.95	0.26	-1.08*	5.02***
	(0.42)	(0.53)	(2.03)	(0.32)	(0.58)	(1.67)
Accessibility						
Number of passenger stations less than 500m away	0.93***	-0.03*	-0.06	0.94***	-0.03*	0.13
	(0.30)	(0.02)	(0.12)	(0.27)	(0.02)	(0.14)
% Zone less than 500m away from a passenger station	0.80***	-0.58***	0.40	0.82***	-0.44*	-0.20
	(0.30)	(0.22)	(1.17)	(0.24)	(0.24)	(1.02)
Centrality						
Average distance to all municipalities in the UA	0.53	-0.02**	0.03*	0.33	0.01	0.03*
	(0.46)	(0.01)	(0.02)	(0.36)	(0.01)	(0.02)
Population access in the UA	1.07***	0.02	-0.72**	1.10***	-0.42	-1.17*
	(0.36)	(0.21)	(0.42)	(0.35)	(0.28)	(0.60)
Road access in the UA	1.21***	0.62	-2.24**	1.21***	-0.77	-2.90***
	(0.36)	(0.63)	(1.04)	(0.35)	(0.55)	(1.08)
Passenger station access in the UA	1.81***	1.20	-12.54***	1.45***	2.71	-8.13**
(without zone municipality)	(0.42)	(0.67)	(4.26)	(0.42)	(2.01)	(3.96)

Notes: (i) Each group of three cells gives the ordinary-least-square estimates of a separate regression of the number of days without leaving home on a dummy indicating whether the respondent is unemployed (Unemp.), the geographical indicator described in line (Indic.) and the interaction between the two; (ii) Standard deviations in parentheses: ***p<0.01, **p<0.05, *p<0.1; (iii) Sample: random draw of one individual by household living in ZRU or ZFU, N = 1070; (iv) Regressions are weighted by sampling weights. The corresponding R-Squared are around 2% for the regressions without fixed effects and 23% for the regressions with fixed effects; (v) *Source*: ENTD 2007-2008, GIS SG-CIV and BD-TOPO®.

3 Descriptive statistics and empirical strategy

Our evaluation of the ZFU program is performed according to its impact on new establishment settlements and employment creation, which are computed from exhaustive administrative data sets. Establishment settlements, disentangled between creations and transfers, are measured with a French database called SIRENE, which gives geolocalized information about the stock of establishments every first day of the year, and about the flow of new settlements during the year. As for employment creation, alternatively measured with the numbers of jobs and hours worked, it is taken from a database managed by the French National Institute of Economics and Statistics (INSEE) called the "Déclarations Annuelles de Données Sociales" (DADS).

Some of the aforementioned statistical information is available directly at the ZFU level, in order to inform policy-makers. However, it is scarce and it does not allow the comparison between ZFU and ZRU neighborhoods, which are not as carefully delimited and monitored. Moreover, the three levels of ZUS, ZRU and ZFU, even though they can be ranked from the viewpoint of policy intervention, are not nested: whereas the boundaries of ZUS and ZRU do match, ZFU were largely redrawn to be more inclusive than the original ZRU (in particular, to include vacant land that could be used by new firms).

To perform a consistent statistical analysis at the neighborhood level, we then use a smaller seed called "Îlots Regroupés pour l'Information Statistique" (hereafter, IRIS). There are around 16,000 IRIS drawn within municipalities eligible for ZFU designation. To identify the relevant statistical information in the targeted neighborhoods and the control group, the boundaries of which do not match the IRIS partition, we choose a simple geographical allocation rule: any IRIS which intersects a targeted zone "x" on more than 50% of its area will be considered as supporting x. We identify 932 IRIS which support a ZRU and 231 IRIS which support a ZFU 2G. Whereas our allocation rule differs, this choice for the unit of observation is also the one made by Rathelot and Sillard (2007), who argue that it has two advantages. First, the IRIS partition is rather homogenous regarding the size of the different units, which mitigates the risk of serious Modifiable Areal Unit Problem.[7] Second, these units are both large enough (around 2,000 inhabitants, on average) to limit the number of missing values and to reduce the level of spatial autocorrelation, and small enough to allow for a precise description of the zones under study. The control group we choose corresponds to all IRIS which support a ZRU that was not designated to become ZFU.

Two caveats in the data make a longitudinal study difficult: the encoding process of establishments location and sector has not been consistent over time. In the SIRENE database, establishments are exactly located, i.e. with their address, between 1995 and 2002 and after 2007, whereas they are only located at the level of the IRIS between 2003 and 2006. Another issue with the information on location is that a few ZFU 2G were enlarged in 2007 but this extension was not taken into account in the 2007 wave of SIRENE. In addition, the nomenclature of the different sectors has also changed a lot in 2007. For all these reasons, we choose to restrict our empirical evaluation of the impact of ZFU 2G to the period 2003-2006.

3.1 Evolution of firm demography

We provide here some descriptive evidence that the ZFU 2G designation has clearly changed the trends in the level and the evolution of economic activity in the targeted areas. The left-hand-side graph in Figure 5 gives the evolution of the average stock of establishments in the ZRU that became ZFU 2G in 2004 and in the ZRU that were not selected.

We take 1995, the year before the implementation of the Urban Revival Pact, as the baseline year. By 2009, the stock of establishments has been multiplied by 1.8 in ZFU 2G and by 1.4 in ZRU. The trends of the two groups start to diverge in 2004, which corresponds to the first year of the treatment. However, the cumulative aspect of stocks makes it hard to isolate the pure impact of the ZFU program. For this reason, we also present the evolution of annual establishment inflows in the right-hand-side graph of Figure 5. As can be seen, the growth rate of establishment inflows in ZFU 2G increases sharply in 2004, before going back to that of the control group after 2007.

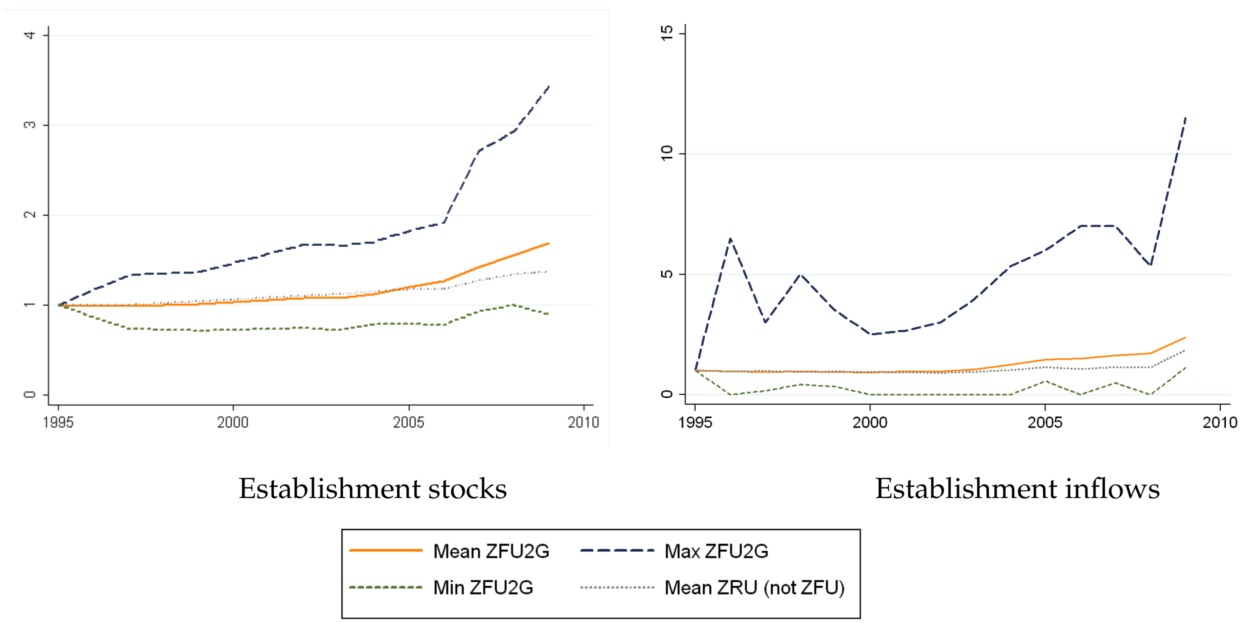
In addition, Figure 6 gives support to our initial claim that the ZFU program had a very heterogeneous impact across locations. The dashed lines represent, for any given year from 1995 (baseline year) to 2009, the highest variation in stocks or in flows. Conversely, the small dashed lines represent the corresponding lowest variations. While, on average, stocks in ZFU 2G have been multiplied by 1.8, some ZFU do not seem to have benefited at all from the program: their stock of establishments may even have decreased, while others have witnessed a 350% increase

[7] The Modifiable Areal Unit Problem is a potential source of statistical bias arising from aggregating data over spatial units of different sizes and shapes (see Briant, Combes, and Lafourcade (2010).

Figure 5: Change in the stock (left) and annual inflow (right) of establishments in ZRU/ZFU 2G

Source: SIRENE.

Figure 6: Heterogeneity in the evolution of establishment inflows and stocks in ZFU 2G



Source: SIRENE.

(see the Min and the Max ZFU 2G in the left-hand-side graph of Figure 6). Because of the higher variability of flows, this heterogeneity is even higher for the annual inflows of establishments: whereas some ZFU have witnessed a decrease in their annual inflows of establishments, others have experienced up to a 10-fold increase (see the Min and the Max ZFU 2G in the right-hand-side graph of Figure 6).

3.2 Empirical strategy

The previous section gives strong support to the common trend assumption in 2003 required by the difference-in-differences approach to identify the impact of the ZFU program for the period 2004-2006. Henceforth, the specification we estimate is the following:

$$\Delta Y_{i\tau} = Y_{i\tau} - Y_{i\tau-1} = \alpha_\tau + \beta T_{i\tau} + \varepsilon_{i\tau}, \tag{2}$$

where i is an IRIS, τ is the observation year, Y is the economic variable of interest (which can be either in log or in absolute values), α_τ is a time dummy capturing conjuncture effects, and $\varepsilon_{i\tau}$ is the error term. The treatment variable $T_{i\tau} = \mathbf{1}_{\tau \geq t_0} \times \mathbf{1}_{i \in ZFU}$ is a dummy equal to 1 for every IRIS support of a ZFU observed after t_0, the implementation date of the program (2004). The coefficient β of this linear regression gives the average treatment effect under the assumption that both treated and untreated units would have followed the same trend in the absence of treatment. The evolution of the treatment effect is estimated with a similar specification:

$$\Delta Y_{i\tau} = \alpha_\tau + \sum_t \gamma_t T_{i\tau t} + \varepsilon_{i\tau}, \tag{3}$$

where $T_{i\tau t} = \mathbf{1}_{\tau \geq t_0} \times \mathbf{1}_{i \in ZFU} \times \mathbf{1}_{\tau = t}$. The coefficient γ_t identifies the incremental effect of the impact of the program in year t and the coefficient γ_{t_0} identifies the immediate impact of the treatment on the evolution of the economic variable Y.

However, we also want to study whether the urban geography of zones can explain part of the heterogeneity in the treatment effect. For this purpose, we consider an augmented framework where the previous variable T is interacted with each of our geographical indicators of spatial isolation:

$$\Delta Y_{i\tau} = \alpha_\tau + \beta T_{i\tau} + \eta G_{ZFU/ZRU \ni i} + \lambda T_{i\tau} \times G_{ZFU/ZRU \ni i} + \varepsilon_{i\tau}, \tag{4}$$

where $G_{ZFU/ZRU \ni i}$ is the indicator describing the geographical situation of the ZRU or the ZFU which is supported by IRIS i. The coefficient λ measures the relative average effectiveness of the ZFU program across locations with different levels of spatial isolation. This is our main parameter of interest. In order to assess the evolution of the impact of geography on the effectiveness of the program, we also estimate the following specification:

$$\Delta Y_{i\tau} = \alpha_\tau + \sum_t \gamma_t T_{i\tau t} + \eta G_{ZFU/ZRU \ni i} + \sum_t \mu_t T_{i\tau t} \times G_{ZFU/ZRU \ni i} + \varepsilon_{i\tau}. \tag{5}$$

Given the possible correlation between our geographical indicators, the analysis of the effect on one single indicator at a time is justified. However, it is not enough to account for the global complexity of the phenomenon under study. For instance, a greater number of train or metro stations in the vicinity of a ZFU increases the likelihood that the ZFU border runs along railroads. In the same vein, road severance at the border may not be prejudicial if there is an highway junction nearby. For this reason, we consider an augmented version of equation (5), where the treatment variables $T_{i\tau t}$ are now interacted with K different indicators, denoted $G_{ZFU/ZRU \ni i}(k)_{k=1,\ldots,K}$:

$$\Delta Y_{i\tau} = \alpha_\tau + \sum_t \gamma_t T_{i\tau t} + \sum_{k=1}^{K} \eta(k) G_{ZFU/ZRU \ni i}(k) + \sum_{k=1}^{K} \sum_t \mu_t(k) T_{i\tau} G_{ZFU/ZRU \ni i}(k) + \varepsilon_{i\tau}. \quad (6)$$

However, even with this strategy, it may be perilous to interpret λ or μ as the causal impact of geography on the effectiveness of the program. Two potential caveats have to be considered. The first relates to timing. The BD TOPO® is continuously updated without historical records for previous years. Subsequently, it may be the case that some of the geographical features of neighborhoods, such as closeness to transportation infrastructures, have been partly caused by, or at least jointly determined with, the ZFU program. However, given the amount of time required to substantially modify the geography of a neighborhood, we believe this is not so problematic. The second caveat is more of an issue. It may well be the case that some geographical characteristics are not perfectly orthogonal to the ZFU designation. Table 10 provided in Appendix C illustrates this issue. The first three columns, which display the results of an unconditional t-test of sample means between treated areas (ZFU 2G) and control areas (ZRU), sometimes exhibit substantial differences. However, the fourth column shows that, conditional on both neighborhoods being located in the same urban area, these differences tend to disappear.[8] To overcome this shortcoming, we consider a declination of equation (6) including UA, ZRU/ZFU or even IRIS fixed effects. By definition, these last two specifications no longer include the geographical indicators themselves because of collinearity issues.

4 Results

This section reports the estimation results of equations (2)-(6), for the second wave of ZFU and for up to ten outcome variables. The first three outcome variables, denoted "New establishments (△ Log)", document the growth rate of the flow of incoming establishments that have settled in the ZFU in the past year. For example, the value for 2004 is given by the difference between the log of the flows in 2004 (December 31st) and 2003 (December 31st). It is computed for the years 2004-2006. We study the growth rate of total inflows and we also distinguish inflows according to whether the new establishments are "pure creations" (entirely new establishments, establishments that have been taken over by a new management or establishments that have been reactivated after a period with no activity), or mere geographical "transfers" from elsewhere. The other outcome variables relate to stocks, which are measured every year on January 1st. The

[8]One exception is river cut-offs, where the values for the ZFU sample are driven by a few outliers. Once these outliers are removed, the within-UA differences are no longer substantial.

variable denoted "New establishments/Stock" is the ratio of the inflow of new establishments on the related stock at the beginning of the year. It is also taken from the SIRENE database. The last outcome variables document the employment creation rate: the first fours, denoted "Jobs (△ Log)" give the growth rate of the total stock of jobs related to different types of workers, and the one denoted "Hours (△ Log)" is the growth rate of the number of hours worked. Contrary to the first four variables, since stocks are computed at the beginning of the year, the value for 2004 is the difference between the logs of the stock in January 1st 2004 and January 1st 2003. For this reason, the impact of the ZFU program on the stocks of jobs and hours can only be observed with a one-year delay in comparison with flows (i.e. 2005 and not 2004).

4.1 Average impact of the ZFU program

Tables 4 and 5 report the estimates of the average impact of the program on respectively establishment settlements and employment. The top panels give the average impact of the ZFU program on the whole period 2004-2006 (coefficient β in equation 2), whereas the bottom panels give its evolution year by year (coefficient γ_t in equation 3).

Table 4: Impact of the transition from ZRU to ZFU 2G on establishments

	New establishments (△ Log)			New establishments (△ Log)
	Total inflow	Creations	Transfers	/ Stock
Treatment - 2004-2006	0.084***	0.032	0.18***	0.048***
	(0.030)	(0.031)	(0.052)	(0.0084)
Observations	2,648	2,615	1,114	2,778
R-squared	0.016	0.008	0.020	0.019
Treatment - 2004	0.17***	0.059	0.45***	0.051***
	(0.052)	(0.055)	(0.098)	(0.015)
Treatment - 2005	0.024	0.022	0.038	0.039***
	(0.052)	(0.054)	(0.088)	(0.015)
Treatment - 2006	0.062	0.017	0.11	0.054***
	(0.052)	(0.054)	(0.086)	(0.015)
Observations	2,648	2,615	1,114	2,778
R-squared	0.017	0.008	0.029	0.019

Notes: (i) Standard errors in parentheses; ***p<0.01, **p<0.05, *p<0.1; (ii) *Source*: SIRENE.

The average impact of the program is an additional 8.4% in the growth rate of establishment inflows on the period 2004-2006. The growth rate of transfers is significantly higher in ZFU 2G than in ZRU ($+18\%$ points), whereas this is not the case for creations from scratch, even though they form the lion's share (around 80%) of total establishment inflows for any given year. The stronger impact on transfers is an indication that some firms have taken advantage of the program to displace preexisting establishments. This windfall effect is in line with Givord, Rathelot, and Sillard (2011) and Mayer, Mayneris, and Py (2011), who both show that the ZFU program is very likely to have had negative spillover effects on the economic performance of the neighboring areas.

Table 5: Impact of the transition from ZRU to ZFU 2G on employment

	Jobs (△ Log) Total	White Collar	Blue Collar & Employees	Intermediate Professions	Hours (△ Log)
Treatment - 2004-2006	0.047**	0.063**	0.045*	0.052*	0.041
	(0.024)	(0.030)	(0.024)	(0.030)	(0.025)
Observations	2,703	2,050	2,677	2,276	2,714
R-squared	0.021	0.010	0.013	0.015	0.021
Treatment - 2004	-0.0081	0.022	0.030	0.038	0.015
	(0.041)	(0.051)	(0.042)	(0.052)	(0.044)
Treatment - 2005	0.082**	0.080	0.073*	-0.0095	0.070
	(0.041)	(0.051)	(0.042)	(0.052)	(0.044)
Treatment - 2006	0.067	0.086*	0.034	0.13**	0.039
	(0.041)	(0.051)	(0.042)	(0.051)	(0.044)
Observations	2,703	2,050	2,677	2,276	2,714
R-squared	0.022	0.011	0.013	0.017	0.021

Notes: (i) Standard errors in parentheses; ***p<0.01, **p<0.05, *p<0.1; (ii) *Source*: DADS.

The program is mostly effective during the first year of implementation. The impact of being targeted as ZFU 2G on the growth rate of establishment inflows is an additional 17% in 2004 (45% for transfers). The effect of the program vanishes immediately the year after, which means that the impact of the program is not exponential,[9] but that it has generated a one-shot increase in the growth regime of new settlements. The positive impact of the program on the flow-stock ratio, which is steady over time, confirms this finding.

The program had a weaker impact on the employment creation rate than on establishment inflows ($+4.7\%$ points). This may indicate that the firms that were created were not big employers. Nonetheless, all classes of workers have reaped benefits from the ZFU program, especially white-collar workers ($+6.3\%$ points). Finally, the program did not have any significant impact on the number of hours worked. However, as will be shown below, this result hides a large heterogeneity across sectors, depending on their labor-capital intensity.

4.2 The role of geography: one indicator at a time

We then study whether the spatial characteristics of the neighborhoods that were designated ZFU can help recover part of the heterogeneity hidden in the average impact of the program. Table 6 gives the estimation results of parameter λ in equation (4) for all the different indicators $G_{ZFU/ZRU \ni i}$ described in Table 1,[10] and for the same outcome variables as before. Each cell is associated with a separate regression and each column relates to a different outcome variable. Because of space limitations, the corresponding estimates of β and R-squared are omitted, but both do not vary much across regressions and stay close to the values provided in Tables 4 and 5. For the same reason, we do not report the estimate of the coefficient η associated with the geographical indicator, which are almost never significant. The fact that geography does not impact the economic performance of neighborhoods *per se*, but only as a factor of effectiveness of the ZFU program, is not problematic, rather the opposite. The difference-in-differences approach is

[9]Indeed, one must bear in mind that the outcome here is the growth rate of the flow of incoming establishments.

[10]In order to prevent the units of the indicators from impacting the results, we center and standardize all indicators.

relevant only if the selection into the ZFU program is independent of geography.

Table 6 shows that geography matters to the effectiveness of the ZFU program. ZFU 2G which have a better transportation accessibility or market access within the UA benefit from a larger growth rate of establishment inflows and stocks than the other. For instance, a one-standard deviation increase in the number of train or metro stations within 500 meters of the ZFU, which is equivalent to adding 2 stations in the area, is associated with a 5.8% point increase in the growth rate of establishment inflows. Compared to the 8.4 % point raise induced by the ZFU program on average, this increase amounts to an additional program effectiveness of 70%. Public transportation services therefore explain the relative success of the ZFU program in large cities such as Paris, which benefit from a very good railroad passenger network. Similarly, the market potential of the ZFU, whether in terms of population, road density or passengers stations, increases by around 10% point the effectiveness of the ZFU program.

By way of contrast, ZFU 2G which are more isolated by cut-offs of any kind clearly underperform. For instance, an increase by one standard deviation in the number of impassable roads separating the ZFU border from the UA main CBD translates into a 6.3% point decrease in establishment settlement growth rate. The other severance indicators (traffic barriers of any type at the border of the ZFU) do not seem to matter as much, unless we consider the most inclusive declination (busy roads). As will be seen below, this lack of significance arises from the fact that the impact of urban severance at the border is not stable over time.

Entry gates into the transportation network do not play a consistent role regarding the effectiveness of the ZFU program. For instance, being far from a rail or metro station clearly has a detrimental effect (-6.2%), whereas the distance to the closest airport works in the opposite direction (+5.3%). However, we can make sense of this finding. Airports are large, impassable enclaves and their closeness is not very likely to matter to the kind of business located in a ZFU.[11] In that sense, distance to airports is rather an indicator of severance than of transportation connectivity. Similarly, the positive impact of railroad severance at the border may be driven by the correlation of this variable with the number of train and metro stations in the vicinity of the neighborhood, which is not included in the regression. The ambiguity of some indicators reminds us that geography is multidimensional. We will come back to this issue in section 4.3.

Interestingly, whereas the previous results relate to the growth rate of establishment inflows, most of them also apply to the growth rate of establishment creations, but not of establishment transfers. This seems to indicate that geography does not play the same role depending on the type of decision which has to be made (create a new establishment from scratch, or simply relocate an existing establishment). This is all the more interesting that the average impact of the program on establishment creations is very weak, unlike transfers (see Table 4). Whereas the existence of negative geographical spillovers is likely to bias the average impact of the ZFU program upward, the fact that geography mostly impacts real establishment creations makes this shortcoming less important regarding the estimation of the impact of geography.

Finally, regarding the role of geography on the other outcome variables, let us note two

[11] For instance, an international airport such as Roissy-Charles-de-Gaulle stretches over the equivalent of one third of the Paris municipality area.

Table 6: Urban geography and the impact of ZFU 2G on establishment inflows

VARIABLES	New establishments (△ Log) Total inflow	Creations	Transfers	New establishments (△ Log) / Stock
Severance				
Urban cut-offs between the neighborhood and the CBDs				
River cut-offs to main CBD in the UA	-0.047***	-0.051***	-0.058*	-0.015**
	(0.014)	(0.015)	(0.032)	(0.0060)
River cut-offs per CBD in the UA	-0.058***	-0.061**	-0.054	-0.020***
	(0.021)	(0.024)	(0.036)	(0.0068)
Average river cut-offs to all CBDs in the UA	-0.058**	-0.062**	-0.051	-0.020***
	(0.022)	(0.025)	(0.037)	(0.0066)
Expressway cut-offs to main CBD in the UA	-0.072***	-0.059***	-0.069*	-0.020***
	(0.019)	(0.020)	(0.037)	(0.0068)
Expressway cut-offs per CBD in the UA	-0.082***	-0.069***	-0.090**	-0.023***
	(0.018)	(0.018)	(0.037)	(0.0069)
Average expressway cut-offs to all CBDs in the UA	-0.081***	-0.069***	-0.088**	-0.023***
	(0.018)	(0.018)	(0.037)	(0.0068)
Impassable road cut-offs to main CBD in the UA	-0.063***	-0.050***	-0.058	-0.016**
	(0.015)	(0.015)	(0.037)	(0.0063)
Impassable road cut-offs per CBD in the UA	-0.082***	-0.069***	-0.083**	-0.021***
	(0.017)	(0.017)	(0.036)	(0.0068)
Average impassable road cut-offs to all CBDs in the UA	-0.081***	-0.068***	-0.083**	-0.021***
	(0.017)	(0.016)	(0.037)	(0.0068)
Railroad cut-offs to main CBD in the UA	-0.056**	-0.043*	-0.079**	-0.015*
	(0.023)	(0.023)	(0.031)	(0.0084)
Railroad cut-offs per CBD in the UA	-0.087***	-0.077***	-0.074*	-0.021***
	(0.017)	(0.019)	(0.037)	(0.0064)
Average railroad cut-offs to all CBDs in the UA	-0.087***	-0.077***	-0.078**	-0.022***
	(0.017)	(0.018)	(0.038)	(0.0066)
Severance at the border				
Road severance at the border (busy roads)	-0.053*	-0.052*	-0.055	-0.0050
	(0.028)	(0.027)	(0.047)	(0.012)
Road severance at the border (big roads)	-0.032	-0.031	0.033	0.022
	(0.029)	(0.027)	(0.057)	(0.015)
Road severance at the border (expressways)	-0.036	-0.029	0.019	0.014
	(0.022)	(0.022)	(0.039)	(0.012)
Road severance at the border (impassable roads)	-0.0083	-0.0088	0.022	0.025*
	(0.032)	(0.029)	(0.051)	(0.013)
Railroad severance at the border	0.062***	0.073***	-0.017	0.0096
	(0.019)	(0.018)	(0.042)	(0.012)
Accessibility				
Distance to transportation				
Distance to closest passenger station	-0.062**	-0.077***	0.011	-0.0095
	(0.032)	(0.029)	(0.060)	(0.019)
Distance to closest highway junction	-0.023	-0.017	-0.066**	-0.012
	(0.021)	(0.019)	(0.032)	(0.0076)
Distance to closest airport	0.053***	0.037**	0.0071	0.0056
	(0.020)	(0.018)	(0.051)	(0.0097)
Distance to closest international airport	0.073***	0.052***	0.088*	0.014
	(0.020)	(0.018)	(0.053)	(0.013)
Catchment area				
Number of parking lots less than 500m away from zone	0.020	0.0075	0.031	0.014
	(0.025)	(0.025)	(0.033)	(0.011)
% Zone less than 500m away from a passenger station	0.052**	0.063***	0.041	0.022**
	(0.021)	(0.020)	(0.041)	(0.011)
Number of passenger stations less than 500m away from zone	0.058**	0.069***	0.013	0.015**
	(0.025)	(0.025)	(0.045)	(0.0069)
Centrality				
Market potentials				
Population access in the UA	0.13***	0.098**	0.081	0.039**
	(0.040)	(0.041)	(0.077)	(0.016)
Population access in the UA (without zone municipality)	0.071***	0.051**	-0.033	0.0088
	(0.020)	(0.020)	(0.046)	(0.013)
Road access in the UA	0.15**	0.11*	0.079	0.038*
	(0.061)	(0.059)	(0.089)	(0.022)
Road access in the UA (without zone municipality)	0.099***	0.075***	0.050	0.016
	(0.024)	(0.024)	(0.049)	(0.012)
Road (weighted) access in the UA	0.14**	0.11*	0.081	0.039*
	(0.061)	(0.058)	(0.083)	(0.021)
Road (weighted) access in the UA (without zone municipality)	0.10***	0.076***	0.046	0.014
	(0.024)	(0.024)	(0.048)	(0.011)
Passenger station access in the UA	0.17***	0.14***	0.16***	0.033*
	(0.022)	(0.027)	(0.057)	(0.017)
Passenger station access in the UA (without zone municipality)	0.049**	0.041**	-0.040	0.0093
	(0.023)	(0.020)	(0.039)	(0.015)
Distance to CBD				
Distance to main CBD in the UA	-0.082***	-0.072***	-0.065*	-0.023***
	(0.022)	(0.020)	(0.036)	(0.0079))
Average distance to all CBDs in the UA	-0.078***	-0.068***	-0.058*	-0.022***
	(0.020)	(0.018)	(0.034)	(0.0078)
Average distance to all municipalities in the UA	-0.083***	-0.069***	-0.070*	-0.023***
	(0.019)	(0.018)	(0.038)	(0.0080)

Notes: (i) Each cell corresponds to the estimate of λ in equation (5). Standard errors in parentheses are clustered by zone; ***p$<$0.01, **p$<$0.05, *p$<$0.1; (ii) *Source*: GIS SG-CIV, BD-TOPO® and SIRENE.

Table 7: Urban geography and the impact of ZFU 2G on employment

VARIABLES	Jobs (△ Log)				Hours (△ Log)
	Total	White-Collar	Blue-Collar & Employees	Interm. Prof.	
Severance					
Urban cut-offs between the neighborhood and the CBDs					
River cut-offs to main CBD in the UA	-0.028**	-0.020	-0.026**	-0.023	-0.022**
	(0.013)	(0.019)	(0.011)	(0.016)	(0.010)
River cut-offs per CBD in the UA	-0.031**	-0.016	-0.031**	-0.019	-0.021*
	(0.014)	(0.019)	(0.013)	(0.022)	(0.012)
Average river cut-offs to all CBDs in the UA	-0.030**	-0.015	-0.031**	-0.017	-0.020*
	(0.014)	(0.019)	(0.013)	(0.022)	(0.012)
Expressway cut-offs to main CBD in the UA	-0.016	-0.0014	-0.024*	-0.033	-0.0093
	(0.013)	(0.015)	(0.014)	(0.023)	(0.013)
Expressway cut-offs per CBD in the UA	-0.020	-0.0028	-0.032**	-0.040*	-0.016
	(0.013)	(0.017)	(0.013)	(0.021)	(0.014)
Average expressway cut-offs to all CBDs in the UA	-0.021	-0.00099	-0.032**	-0.039*	-0.016
	(0.014)	(0.017)	(0.014)	(0.021)	(0.014)
Impassable road cut-offs to main CBD in the UA	-0.011	0.011	-0.014	-0.029	-0.0088
	(0.012)	(0.013)	(0.013)	(0.020)	(0.012)
Impassable road cut-offs per CBD in the UA	-0.014	0.0035	-0.020	-0.032	-0.011
	(0.014)	(0.015)	(0.013)	(0.021)	(0.014)
Average impassable road cut-offs to all CBDs in the UA	-0.016	0.0034	-0.022	-0.032	-0.013
	(0.014)	(0.015)	(0.013)	(0.021)	(0.014)
Railroad cut-offs to main CBD in the UA	-0.012	0.0071	-0.026*	-0.016	-0.00066
	(0.013)	(0.015)	(0.015)	(0.024)	(0.014)
Railroad cut-offs per CBD in the UA	-0.0073	0.011	-0.021	-0.031	0.0024
	(0.013)	(0.016)	(0.014)	(0.021)	(0.015)
Average railroad cut-offs to all CBDs in the UA	-0.0082	0.010	-0.022	-0.034*	0.00085
	(0.013)	(0.017)	(0.014)	(0.020)	(0.015)
Severance at the border					
Road severance at the border (busy roads)	-0.0035	-0.017	-0.00090	-0.056**	-0.0067
	(0.014)	(0.021)	(0.015)	(0.024)	(0.016)
Road severance at the border (big roads)	0.0080	0.013	0.028	-0.044*	-0.0046
	(0.021)	(0.024)	(0.020)	(0.025)	(0.021)
Road severance at the border (expressways)	0.013	0.0041	0.012	-0.055***	0.0081
	(0.015)	(0.019)	(0.018)	(0.021)	(0.016)
Road severance at the border (impassable roads)	0.013	0.022	0.030*	0.0084	0.014
	(0.017)	(0.024)	(0.017)	(0.027)	(0.018)
Railroad severance at the border	0.00091	-0.0063	0.016	0.019	-0.0038
	(0.017)	(0.018)	(0.020)	(0.028)	(0.018)
Accessibility					
Distance to transportation					
Distance to closest passenger station	0.00100	-0.021	-0.011	-0.020	-0.0090
	(0.027)	(0.027)	(0.027)	(0.037)	(0.029)
Distance to closest highway junction	0.027	0.011	0.017	-0.0078	0.031
	(0.021)	(0.013)	(0.022)	(0.019)	(0.020)
Distance to closest airport	-0.015	-0.022	-0.012	-0.036**	-0.020
	(0.014)	(0.017)	(0.015)	(0.017)	(0.016)
Distance to closest international airport	-0.012	-0.037**	-0.0091	-0.0011	-0.014
	(0.016)	(0.018)	(0.019)	(0.022)	(0.016)
Catchment area					
Number of parking lots less than 500m away from zone	0.011	0.0042	0.027	0.034*	0.013
	(0.020)	(0.022)	(0.020)	(0.020)	(0.023)
% Zone less than 500m away from a passenger station	0.025*	0.018	0.038**	0.016	0.033**
	(0.014)	(0.024)	(0.016)	(0.028)	(0.016)
Number of passenger stations less than 500m away from zone	0.021	0.060***	0.044***	0.033*	0.040*
	(0.015)	(0.018)	(0.012)	(0.019)	(0.022)
Centrality					
Market potentials					
Population access in the UA	-0.024	-0.022	-0.028	0.0055	-0.019
	(0.031)	(0.028)	(0.032)	(0.039)	(0.027)
Population access in the UA (without zone municipality)	0.016	-0.028	0.022	0.0045	0.016
	(0.023)	(0.020)	(0.021)	(0.019)	(0.023)
Road access in the UA	-0.051	-0.038	-0.049	-0.031	-0.045
	(0.036)	(0.036)	(0.038)	(0.046)	(0.033)
Road access in the UA (without zone municipality)	-0.012	-0.038**	-0.0023	-0.022	-0.017
	(0.020)	(0.017)	(0.020)	(0.022)	(0.019)
Road (weighted) access in the UA	-0.049	-0.033	-0.046	-0.027	-0.042
	(0.032)	(0.034)	(0.035)	(0.044)	(0.030)
Road (weighted) access in the UA (without zone municipality)	-0.012	-0.039**	-0.0034	-0.024	-0.018
	(0.019)	(0.017)	(0.019)	(0.021)	(0.018)
Passenger station access in the UA	-0.016	-0.018	-0.0067	0.019	-0.016
	(0.019)	(0.022)	(0.021)	(0.035)	(0.019)
Passenger station access in the UA (without zone municipality)	0.023	0.0021	0.028	-0.0028	0.021
	(0.021)	(0.023)	(0.020)	(0.020)	(0.021)
Distance to CBD					
Distance to main CBD in the UA	-0.018	0.0060	-0.024*	-0.039**	-0.016
	(0.013)	(0.018)	(0.013)	(0.018)	(0.013)
Average distance to all CBDs in the UA	-0.013	0.0096	-0.021*	-0.032*	-0.013
	(0.012)	(0.018)	(0.012)	(0.018)	(0.012)
Average distance to all municipalities in the UA	-0.015	0.015	-0.025*	-0.029	-0.011
	(0.014)	(0.018)	(0.014)	(0.021)	(0.014)

Notes: (i) Each cell corresponds to the estimate of λ in equation (5). Standard errors in parentheses are clustered by zone; ***p<0.01, **p<0.05, *p<0.1; (ii) *Source*: GIS SG-CIV, BD-TOPO® and DADS.

interesting results: first, a large majority of the accessibility and severance indicators have a strong, yet weaker, impact on the the growth rate of flow-stock ratio. This might be due to the fact that this variable is less volatile than flows. Second, as shown in Table 7, urban geography is a lesser determinant of effectiveness regarding employment variables. But this result hides a large heterogeneity between skills. For instance, white-collar jobs are less sensitive to urban cut-offs than the others and the proximity of an international airport does matter for them. By way of contrast, intermediate professions are sensitive to the proximity of domestic airports, whereas airports do not matter for the creation of blue-collar jobs. In the same vein, the ZFU program is more effective to create blue-collar and intermediate jobs when the ZFU is not too far from the UA CBDs, whereas it is not the case for white-collars. Since these results might also hide some heterogeneity between industries and be subject to sector-specific structure effects, we perform a separate analysis on two emblematic sectors - health and manufacturing - in the last part of this section.

We also study how the effect of urban geography evolves over time. Tables 11, 12, 13, 14 and 15, that are displayed in Appendix C for clarity purposes, give the estimation results of the parameters μ_t, $t \geq t_0$, of equation (5) for all the geographical indicators $G_{ZFU/ZRU \ni i}$. Each line is associated with a separate regression and each table is associated with one outcome variable, indicated in the table's title. As before, because of space limitations, the corresponding estimates of γ_t, $t \geq t_0$, and the related R-squared are omitted. The main message is that the role played by geography is especially visible on the first year after the program is implemented (2004 for flows and 2005 for stocks), which is perfectly consistent with our previous conclusions regarding the average impact of the program over time. Some geographical indicators, which did not seem to matter on average, do matter actually when the program is effective, i.e. on the first year of its implementation. This is for instance the case for all our road severance indicators: a one-standard deviation decrease in expressways severance is associated with a 8% additional increase in establishment inflows over the average ZFU program effectiveness in 2004. The magnitude of this additional impact increases if we consider more inclusive definitions of roads, up to 16% for busy roads. Moreover, whereas geography did not seem to play any role on average for transfers and jobs (see Tables 6 and 7), this is no longer the case when we break the analysis by year.

However, the main conclusions drawn previously remain valid: geography matters more to creations than to transfers and more to establishment settlement than to job creation rates.

4.3 The role of geography: several indicators simultaneously

Table 8 provides an example of the estimation results of γ_t and $\mu_t(k)$ from equation (6) for different geographical indicators taken simultaneously, from $K = 1$ (column (1)) to $K = 5$ (columns (5) to (9)). The dependent variable is the growth rate of total establishment inflows.

The inclusion of several indicators in columns (1) to (5) show that, even if some indicators are correlated, it is possible to disentangle between the effects of accessibility, severance and centrality. The impact of the three types of indicators remains significant even when they are included together in the specification, and coefficient estimates have the expected sign: more accessible,

Table 8: Multi-dimensional geography and the impact of ZFU 2G on the growth of establishment inflows

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treatment - 2004	0.14**	0.14**	0.17***	0.20***	0.20***	0.20***	0.18***	0.16**	0.16*
	(0.060)	(0.060)	(0.062)	(0.057)	(0.054)	(0.055)	(0.062)	(0.082)	(0.088)
Treatment - 2005	0.032	0.030	0.017	0.023	0.023	0.023	0.0097	-0.0096	-0.0033
	(0.046)	(0.045)	(0.045)	(0.045)	(0.045)	(0.045)	(0.055)	(0.082)	(0.088)
Treatment - 2006	0.051	0.052	0.058	0.052	0.052	0.052	0.035	0.019	0.019
	(0.054)	(0.054)	(0.056)	(0.059)	(0.059)	(0.059)	(0.057)	(0.082)	(0.088)
Accessibility									
Catchment area									
Nb of pass. stations < 500m away from zone	-0.025*	-0.024	-0.023	-0.024	-0.021	-0.021	-0.055***		
	(0.015)	(0.015)	(0.015)	(0.016)	(0.015)	(0.015)	(0.018)		
Nb of pass. stations < 500m away from zone x Treat - 2004	0.096*	0.092*	0.12***	0.090*	0.073*	0.073*	0.080**	0.069	0.072
	(0.053)	(0.055)	(0.044)	(0.047)	(0.038)	(0.038)	(0.040)	(0.050)	(0.054)
Nb of pass. stations < 500m away from zone x Treat - 2005	0.021	0.025	0.0096	0.0026	-0.0033	-0.0033	0.0039	-0.0069	0.000023
	(0.022)	(0.022)	(0.023)	(0.025)	(0.026)	(0.026)	(0.030)	(0.050)	(0.054)
Nb of pass. stations < 500m away from zone x Treat - 2006	0.060**	0.055*	0.059**	0.067**	0.064**	0.064**	0.072**	0.061	0.065
	(0.030)	(0.030)	(0.029)	(0.031)	(0.030)	(0.030)	(0.030)	(0.049)	(0.053)
Distance to transportation									
Distance to closest highway junction		0.0037	0.0032	0.0039	0.0015	0.0015	-0.0096		
		(0.0081)	(0.0082)	(0.0082)	(0.0082)	(0.0082)	(0.027)		
Distance to closest highway junction x Treat - 2004		-0.021	-0.021	-0.039	-0.077**	-0.077**	-0.10***	-0.12*	-0.12*
		(0.038)	(0.035)	(0.029)	(0.035)	(0.035)	(0.038)	(0.068)	(0.073)
Distance to closest highway junction x Treat - 2005		0.025	0.026	0.021	0.015	0.015	-0.0100	-0.029	-0.029
		(0.028)	(0.026)	(0.026)	(0.030)	(0.029)	(0.040)	(0.068)	(0.073)
Distance to closest highway junction x Treat - 2006		-0.027	-0.027	-0.023	-0.022	-0.022	-0.046	-0.064	-0.061
		(0.037)	(0.037)	(0.037)	(0.043)	(0.044)	(0.042)	(0.068)	(0.073)
Severance									
Severance at the border									
Road severance at the border (impassable roads)			-0.0036	-0.0035	-0.0052	-0.0052	0.000021		
			(0.0079)	(0.0079)	(0.0080)	(0.0081)	(0.012)		
Road severance at the border (impassable roads) x Treat - 2004			-0.16***	-0.14***	-0.11**	-0.11**	-0.12**	-0.11	-0.11
			(0.050)	(0.047)	(0.045)	(0.045)	(0.052)	(0.081)	(0.087)
Road severance at the border (impassable roads) x Treat - 2005			0.076*	0.082*	0.090**	0.090**	0.070	0.080	0.076
			(0.041)	(0.042)	(0.046)	(0.046)	(0.054)	(0.081)	(0.087)
Road severance at the border (impassable roads) x Treat - 2006			-0.030	-0.034	-0.032	-0.032	-0.052	-0.042	-0.045
			(0.057)	(0.057)	(0.062)	(0.062)	(0.065)	(0.080)	(0.086)
Cut-offs between the neighborhood and the CBDs									
Railroad cut-offs to main CBD in the UA				0.0088	0.0053	0.0055	-0.0023		
				(0.0093)	(0.0095)	(0.012)	(0.015)		
Railroad cut-offs to main CBD in the UA x Treat - 2004				-0.12***	-0.097**	-0.097**	-0.086*	-0.10*	-0.10
				(0.040)	(0.046)	(0.047)	(0.052)	(0.058)	(0.062)
Railroad cut-offs to main CBD in the UA x Treat - 2005				-0.034	-0.027	-0.027	-0.016	-0.032	-0.032
				(0.038)	(0.037)	(0.036)	(0.040)	(0.058)	(0.062)
Railroad cut-offs to main CBD in the UA x Treat - 2006				0.014	0.018	0.018	0.028	0.012	0.012
				(0.027)	(0.027)	(0.028)	(0.026)	(0.058)	(0.062)
Centrality									
Market potentials									
Pop. access in the UA (without zone municipality)					-0.013	-0.013	0.018		
					(0.010)	(0.010)	(0.015)		
Pop. access in the UA (without zone municipality) x Treat - 2004					0.13***	0.13***	0.14***	0.17**	0.18**
					(0.041)	(0.042)	(0.048)	(0.067)	(0.072)
Pop. access in the UA (without zone municipality) x Treat - 2005					0.041	0.041	0.052	0.081	0.093
					(0.041)	(0.040)	(0.049)	(0.067)	(0.072)
Pop. access in the UA (without zone municipality) x Treat - 2006					0.016	0.016	0.026	0.054	0.060
					(0.053)	(0.053)	(0.051)	(0.066)	(0.071)
Paris region dummy	No	No	No	No	No	Yes	No	No	No
UA fixed effects	No	No	No	No	No	No	Yes	No	No
ZRU/zone fixed effects	No	No	No	No	No	No	No	Yes	No
IRIS fixed effects	No	No	No	No	No	No	No	No	Yes
Nb Observations	2,648	2,648	2,648	2,648	2,648	2,648	2,648	2,648	2,648
R-squared	0.021	0.021	0.025	0.029	0.031	0.031	0.046	0.065	0.124

Notes: (i) Standard deviations in parentheses (robust to clustering by zone for columns (1) to (7)): ***p<0.01, **p<0.05, *p<0.1; (ii) *Source*: GIS SG-CIV, BD-TOPO® and SIRENE.

central and connected neighborhoods reap more benefits from the program, unlike spatially isolated neighborhoods. Moreover, it can be the case that some of the interaction variables only appear to have a significant impact when the specification includes all relevant dimensions of urban geography: this is the case for the distance to the closest highway junction.

Finally, columns (6) to (9) test the robustness of the richest specification to the inclusion of location fixed effects: a Paris region dummy (column (6)), UA fixed effects (column (7)), ZRU/ZFU fixed effects (column (8)) and IRIS fixed effects (column (9)). These fixed effects account for a rather important share of unobserved heterogeneity, as illustrated by the R-squared increase from 3% (column (5)) to 12% (column (9)).

The results are very robust: the coefficient estimates on the interaction variable remain stable. However, the standard errors do increase a lot given the number of constraints imposed by the fixed-effect specifications, especially the last one.

4.4 Sectoral analysis

Finally, we consider another dimension of heterogeneity: the sectoral composition of the population of firms. We want to see whether this dimension, in itself or combined with geography, can also contribute to explain why the impact of the ZFU program varies across locations. We draw two polar examples from the French typology of economic activities: "health and social work" and "manufacturing". The health and social sector mostly encompasses self-employed workers, such as nurses or physicians. It is neither capital-intensive, nor space-consuming, unlike the manufacturing sector, which designates middle-sized to large establishments. As such, we may expect the former to be more sensitive to tax incentives than the latter, and to relocate more quickly, at lower cost. Table 9 displays the estimates of the average impact of the ZFU 2G program on these two sectors. Results are consistent with this conjecture: for instance, ZFU 2G have witnessed a 15% increase in the growth rate of the number of hours worked in the medical sector on average (+24% in the first year of implementation), but nothing in the manufacturing sector.

Table 9: Impact of the transition from ZRU to ZFU 2G on the growth rate of hours worked in two polar sectors

VARIABLES	Manufacturing	Health and social work
Treatment - 2004-2006	0.06	0.15***
	(0.04)	(0.004)
Observations	1,612	1,421
R-squared	0.003	0.02
Treatment - 2004	0.11	0.01
	(0.07)	(0.07)
Treatment - 2005	-0.03	0.24***
	(0.07)	(0.07)
Treatment - 2006	0.10	0.19***
	(0.07)	(0.07)
Observations	1,612	1,421
R-squared	0.004	0.024

Notes: (i) Standard errors in parentheses; ***p<0.01, **p<0.05, *p<0.1; (ii) *Source*: DADS.

The specific impact of the ZFU program on the health sector has already been noted by policy-makers and is also mentioned in Mayer, Mayneris, and Py (2011). In addition to its relatively high labor-intensity, other features may also explain why this sector is more impacted by the ZFU program: in particular, the relationship of health-related firms to their surroundings and the level of mobility in the daily activity of these firms. As it is, the French private health sector is characterized by a high level of mobility: for instance, self-employed nurses mostly work at their patients' homes, which are often located outside the ZFU. On the contrary, most of the activity in the manufacturing sector is done within the borders of the ZFU. Whereas health and social workers may then need to be able to commute easily inside, to and from the ZFU, it may not be as important to the people who work at the plant. Finally, if this whole story were true, one should observe that the geographical characteristics of the ZFU matter more to the program impact on the health than on the manufacturing sector. Table 16 in Appendix C shows that, once again, this conjecture is verified for the first year of implementation, especially for cut-off severance indicators and distance to CBDs, which clearly undermine the capacity of the program to increase total employment as measured by the number of hours worked in the neighborhood. For example, a one standard deviation increase in the average number of impassable road cut-offs to CBDs in the urban area is associated with a 12% decrease in the growth rate of hours worked in the medical sector, whereas there is no sizeable effect in manufacturing.

5 Conclusion

This paper is an attempt to give empirical support to the simple statement that local geography should matter to the success or failure of place-based programs. Using a new data set which describes the level of spatial isolation of the neighborhoods that were targeted by the French enterprise zone program, it shows that this program was more likely to have a positive impact on local economic outcomes when the targeted neighborhoods were connected enough to the other parts of the city. Geography, which was not explicitly taken into account in the selection process of the ZFU, can partly explain why the average impact of this costly program is so weak. Two geographical dimensions have particularly conditioned the success of the ZFU program in France. Transportation accessibility, and more particularly access to road and train or metro stations, enhances the program's ability to attract firms and to create jobs. By way of contrast, discontinuities generated by traffic or natural barriers between the neighborhood and the main employment centers of its urban area hinder the benefits of tax-breaks and social exemptions. Geography matters in itself but also matters in combination with other features of the local economic fabric, in particular the distribution of the population of firms between sectors and the distribution of the workforce between different skill levels.

From a policy perspective, our results highlight the existence of a trade-off between equity and efficiency. The most efficient way to implement place-based policies, such as enterprise zones, would be to target the neighborhoods according to several geographical criteria, namely their accessibility, centrality and connections to transportation networks. However, in doing so, the most isolated areas would be left behind, whereas they may be the ones that are the most in need of public intervention. In this respect, one can but acknowledge the necessity of combining place-based tax breaks and employment incentives with public investments in transportation infrastructure and services. The current "Grand Paris" global project, which aims at building a metro ring around the inner suburbs of Paris, as well as supporting sustainable economic and urban development, may be a right step in this direction. However, the cost of such investments - around 20 billions euro for the "Grand Paris" metro station project - calls for a cautious cost-benefit analysis that is difficult to undertake given that transportation infrastructures have multiple other purposes than reviving depleted urban areas.

References

BARTIK, T. (2004): "Evaluating the impacts of local economic developments. Development policies on local econmic outcomes: what has been done and what is doable?," *OCDE report: Evaluating local economic and employment development*.

BONDONIO, D., AND J. ENGBERG (2000): "Enterprise zones and local employment: Evidence from the states' programs," *Regional Science and Urban Economics*, 30, 519–549.

BONDONIO, D., AND R. GREENBAUM (2007): "Do local taxes incentives affect economic growth? what mean impacts miss in the analysis of enterprise zones policies," *Regional Science and Urban Economics*, 37, 121–136.

BRIANT, A., P.-P. COMBES, AND M. LAFOURCADE (2010): "Dots to Boxes: Do the Size and Shape of Spatial Units Jeopardize Economic Geography Estimations?," *Journal of Urban Economics*, 67(3), 287–302.

BUTTON, K. (2010): *Transport economics*. Edward Elgar.

COULSON, N. E., D. LAING, AND P. WANG (2001): "Spatial Mismatch in Search Equilibrium," *Journal of Labor Economics*, 19(4), 949–72.

FREEDMAN, M. (2012): "Targeted Business Incentives and Local Labor Markets," *WP Cornell University*.

GIVORD, P., R. RATHELOT, AND P. SILLARD (2011): "Place-based tax exemptions and displacement effects: An evaluation of the Zones Franches Urbaines program," *WP Insee-Crest*.

GLAESER, E., AND J. GOTTLIEB (2008): "The economics of place-making policies," *Brookings Papers on Economic Activity*, 1(155-253).

GOBILLON, L., T. MAGNAC, AND H. SELOD (2010): "Do unemployed workers benefit from enterprise zones? The French experience," *WP CEPR*.

HAM, J. C., C. SWENSON, A. IMROHOROGLU, AND H. SONG (2011): "Government programs can improve local labor markets: Evidence from State Enterprise Zones, Federal Empowerment Zones and Federal Enterprise Community," *Journal of Public Economics*, 95(7-8), 779–797.

HANDY, S. (2003): "Amenity and severance," *Handbook of Transport and the Environment*, pp. 117–140.

HARRIS, C. (1954): "The market as a factor in the localization of industry in the United States," *Annals of the Association of American Geographers*, 44(4), 315–348.

HÉRAN, F. (2011): *La ville morcelée*. Economica.

JACOBS, J. (1961): *The death and life of great American cities*. Random House.

MAYER, T., F. MAYNERIS, AND L. PY (2011): "The Impact of Urban Enterprise Zones on Establishment Location Decisions - Evidence from French ZFUs," *Mimeo Sciences Po*.

NEUMARK, D., AND J. KOLKO (2010): "Do enterprise zones create jobs? Evidence from California's enterprise zone program," *Journal of Urban Economics*, 68(1), 1–19.

O'KEEFE, S. (2004): "Job creation in California's enterprise zones: A comparison utilizing a propensity score matching model," *Journal of Urban Economics*, 55, 131–150.

PAPKE, L. (2004): "Tax policy and urban development: Evidence from the Indiana enterprise zone program," *Journal of Public Economics*, 54, 37–49.

PATACCHINI, E., AND Y. ZENOU (2007): "Spatial dependences in local unemployment rates," *Journal of Economic Geography*, 7(2), 169–191.

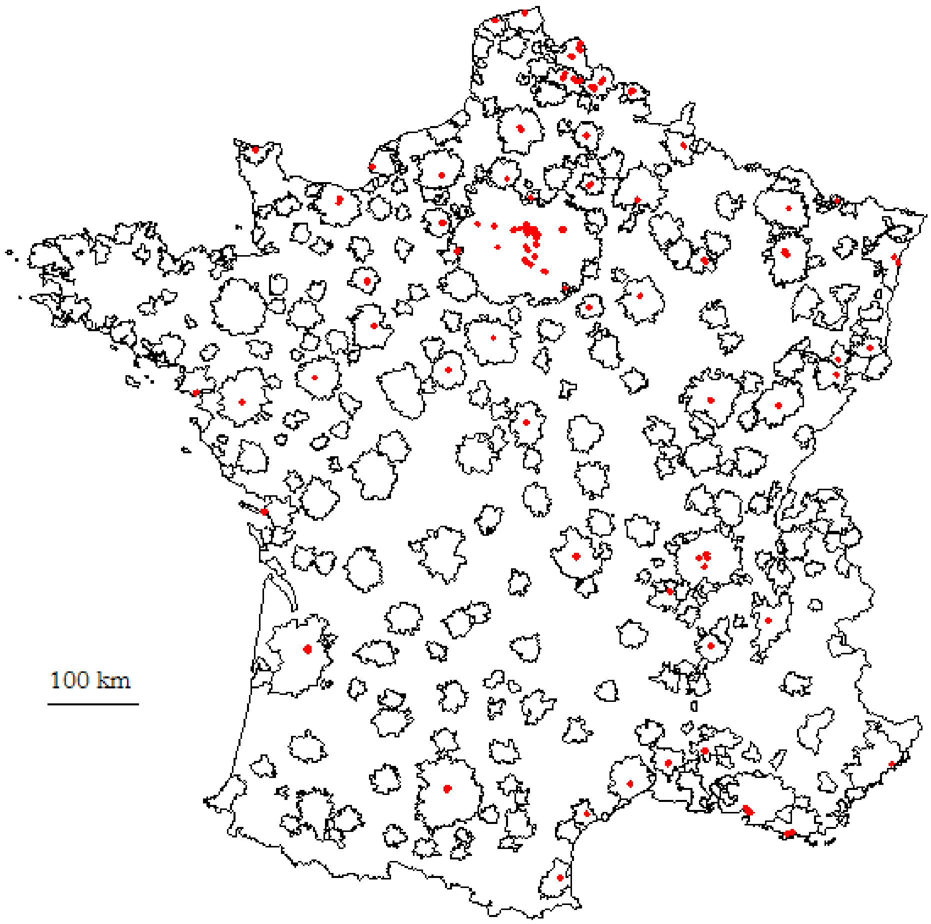
RATHELOT, R., AND P. SILLARD (2007): "Zones Franches Urbaines : quels effets sur l'emploi salarié et les créations d'établissements ?," *WP Insee-Crest*.

——— (2009): "Zones Franches Urbaines : quels effets sur l'emploi salarié et les créations d'établissements ?," *Economie et Statistique*, 415-416, 81–96.

ZENOU, Y. (2002): "How do firms redline workers," *Journal of Urban Economics*, 52(3), 391–408.

A Appendix: the location of ZFU

Figure 7: The location of the 93 ZFU in continental France



Notes: (i) the black lines denote the urban areas; the red dots are the 93 ZFU; (ii) The seven ZFU in Corsica and in overseas French territories are not represented; (iii) *Source*: GIS SG-CIV.

B Appendix: the tax design of ZFU

In ZUS, local authorities are empowered to decide that firms should benefit from tax exemptions. However, these exemptions are very limited (to real estate contributions, notably) and the fiscal component of the ZUS part of the program is only marginal. This is not the case in ZRU, where firms may be exempted from various taxes and contributions if they ask for it:

- employer social contributions: this applies to any additional worker who is hired for at least a year, in the limit of 50 employees. The exemption is total for one year;
- tax on corporate profits: this applies to firms the headquarters of which are located in the ZRU and excludes the banking, finance, insurance, housing and sea-fishing sectors; The exemption is total for the first two years and decreasing over the next three years;
- business tax: this applies to establishments with less than 150 employees. The exemption is total for the first five years and may be extended, at a decreasing rate, to three additional years;
- property tax on existing buildings: the exemption may last five years;
- individual social contributions: this applies to self-employed craftsmen and salesmen, up to five years.

However, this fiscal package in ZRU is almost negligible in terms of the total cost it implies, as compared to the fiscal package in ZFU, even though ZRU still remain more than three and half more numerous than ZFU after the last ZFU wave. The ZFU fiscal package includes the following exemptions:

- employer social contributions for all jobs (new and existing); this applies to firms with less than 50 employees and a turnover lower than 10,000,000 euros, and it is subject to a restriction whereby one new worker out of three must be living in the targeted neighborhood. The exemption is total for five years and decreasing over a period that runs between three and nine additional years;
- tax on corporate profits: this also only applies for firms with less than 50 employees. The exemption is total for five years and decreasing for the next nine years;
- business tax: once again, this applies to firms with less than 50 employees. The exemption is total for five years and may be extended, at a decreasing rate, to between three and nine years, according to the number of employees;
- property tax on existing buildings: the exemption may last five years;
- individual social contributions: this applies to self-employed craftsmen and salesmen, up to five years.
- transaction costs related to the purchasing of a business or a clientele (for medical professions, for instance) are also reduced.

C Appendix: additional tables

Table 10: Geographical differences between ZFU 2G and ZRU

	ZFU 2G	ZRU	Difference	Coeff. ZFU 2G
Severance				
Urban cut-offs between the neighborhood and the CBDs				
River cut-offs to main CBD in the UA	42.59	3.07	39.5***	46.77***
River cut-offs per CBD in the UA	36.5	3.0	33.4***	39.6***
Average river cut-offs to all CBDs in the UA	37.6	3.1	34.5***	40.8***
Railroad cut-offs to main CBD in the UA	10.54	4.97	5.57***	2.27***
Railroad cut-offs per CBD in the UA	10.66	5.13	5.54***	1.90**
Average railroad cut-offs to all CBDs in the UA	9.93	5.28	4.64**	0.54
Expressway cut-offs to main CBD in the UA	8.93	4.93	3.99**	0.71
Expressway cut-offs per CBD in the UA	8.92	4.93	3.99**	0.71
Average expressway cut-offs to all CBDs in the UA	8.34	4.73	3.62**	0.38
Impassable road cut-offs to main CBD in the UA	9.22	5.66	3.56*	-0.1
Impassable road cut-offs per CBD in the UA	9.21	5.67	3.55**	-0.11
Average impassable road cut-offs to all CBDs in the UA	9.40	5.72	3.68	-0.06
Severance at the border				
Road severance at the border (busy roads)	0.55	0.53	0.01	-0.02
Road severance at the border (big roads)	0.29	0.26	0.02	0.02
Road severance at the border (expressways)	0.15	0.11	0.04	0.04
Road severance at the border (impassable roads)	0.19	0.12	0.07***	0.06**
Road severance at the border (railroads)	0.11	0.07	0.04**	0.04**
Accessibility				
Distance to transportation				
Distance to closest passenger station	0.70	1.17	-0.46**	-0.24
Distance to closest highway junction	8.71	11.2	-2.52	-0.85
Distance to closest international airport	34.27	44.66	-10.38*	-0.25**
Catchment area				
% zone less than 500m away from a passenger station	0.15	0.12	0.03	-0.02
Number of parking lots less than 500m away from zone	11.39	5.74	5.65***	6.33***
Number of passenger stations less than 500m away from zone	1.56	0.58	0.99***	0.95***
Centrality				
Market potentials				
Population access in the UA	0.20	0.28	-0.09*	-0.005
Population access in the UA (without zone municipality)	0.10	0.10	-0.003	0.005
Road access in the UA	0.11	0.18	-0.07***	0.000
Road access in the UA (without zone municipality)	0.08	0.10	-0.018***	0.002
Road (weighted) access in the UA	0.11	0.18	-0.07***	-0.000
Road (weighted) access in the UA (without zone municipality)	0.08	0.10	-0.018***	0.002
Passenger station access in the UA	0.18	0.23	-0.05	0.01
Passenger station access in the UA (without zone municipality)	0.09	0.09	-0.001	0.003
Distance to CBD				
Distance to main CBD in the UA	8.73	7.11	1.63	-1.40
Average distance to all CBDs in the UA	8.41	7.03	1.38	-1.62
Average distance to all municipalities in the UA	14.21	10.85	3.37**	-1.10

Notes: (i) These statistics are based on the comparison between the ZFU 2G and the ZRU that do not support a ZFU; (ii) Column "Difference" gives the significance of the difference between the first two columns; column "Coeff. ZFU 2G" gives the coefficient associated with the dummy variable"ZFU 2G" in an ordinary-least-square regression of the geographical indicator described in line, on this dummy variable and UA fixed effects; (iii) significance: ***p<0.01, **p<0.05, *p<0.1; *Source*: SIG SG-CIV and BD TOPO®.

Table 11: Urban geography and the impact of ZFU 2G on the growth of establishment inflows by year

VARIABLES	2004	2005	2006
Severance			
Urban cut-offs between the neighborhood and the CBDs			
River cut-offs to main CBD in the UA	-0.072***	-0.0034	-0.066**
	(0.024)	(0.018)	(0.029)
River cut-offs per CBD in the UA	-0.089***	-0.023	-0.063*
	(0.030)	(0.027)	(0.036)
Average river cut-offs to all CBDs in the UA	-0.088***	-0.023	-0.062*
	(0.031)	(0.028)	(0.037)
Expressway cut-offs to main CBD in the UA	-0.13***	-0.019	-0.062*
	(0.037)	(0.031)	(0.035)
Expressway cut-offs per CBD in the UA	-0.14***	-0.034	-0.076**
	(0.037)	(0.032)	(0.034)
Average expressway cut-offs to all CBDs in the UA	-0.14***	-0.035	-0.074**
	(0.037)	(0.032)	(0.034)
Impassable road cut-offs to main CBD in the UA	-0.12***	-0.0070	-0.066*
	(0.036)	(0.026)	(0.037)
Impassable road cut-offs per CBD in the UA	-0.14***	-0.026	-0.075**
	(0.038)	(0.029)	(0.036)
Average impassable road cut-offs to all CBDs in the UA	-0.15***	-0.026	-0.072**
	(0.037)	(0.029)	(0.036)
Railroad cut-offs to main CBD in the UA	-0.14***	-0.024	-0.00058
	(0.038)	(0.034)	(0.028)
Railroad cut-offs per CBD in the UA	-0.14***	-0.055*	-0.069*
	(0.037)	(0.032)	(0.036)
Average railroad cut-offs to all CBDs in the UA	-0.14***	-0.056*	-0.065*
	(0.037)	(0.030)	(0.036)
Severance at the border			
Road severance at the border (busy roads)	-0.16***	0.057*	-0.058
	(0.056)	(0.034)	(0.043)
Road severance at the border (big roads)	-0.12**	0.056	-0.036
	(0.049)	(0.040)	(0.061)
Road severance at the border (expressways)	-0.080*	0.032	-0.060
	(0.048)	(0.036)	(0.049)
Road severance at the border (impassable roads)	-0.092	0.069*	-0.0014
	(0.061)	(0.036)	(0.064)
Railroad severance at the border	0.13**	-0.013	0.068*
	(0.053)	(0.040)	(0.038)
Accessibility			
Distance to transportation			
Distance to closest passenger station	-0.16*	0.025	-0.056
	(0.092)	(0.056)	(0.074)
Distance to closest highway junction	-0.049	0.022	-0.041
	(0.039)	(0.027)	(0.037)
Distance to closest airport	0.088*	0.054	0.019
	(0.048)	(0.039)	(0.056)
Distance to closest international airport	0.12***	0.074*	0.024
	(0.047)	(0.041)	(0.055)
Catchment area			
Number of parking lots less than 500m away from zone	0.0052	0.039	0.015
	(0.050)	(0.026)	(0.046)
% Zone less than 500m away from a passenger station	0.062	0.021	0.074*
	(0.050)	(0.032)	(0.038)
Number of passenger stations less than 500m away from zone	0.096*	0.021	0.060**
	(0.053)	(0.022)	(0.030)
Centrality			
Market potentials			
Population access in the UA	0.24**	0.10	0.045
	(0.10)	(0.062)	(0.10)
Population access in the UA (without zone municipality)	0.16***	0.040	0.016
	(0.049)	(0.037)	(0.047)
Road access in the UA	0.32**	0.17**	-0.038
	(0.15)	(0.080)	(0.15)
Road access in the UA (without zone municipality)	0.22***	0.072*	0.015
	(0.049)	(0.039)	(0.061)
Road (weighted) access in the UA	0.32**	0.15**	-0.031
	(0.15)	(0.076)	(0.14)
Road (weighted) access in the UA (without zone municipality)	0.22***	0.070*	0.020
	(0.048)	(0.039)	(0.060)
Passenger station access in the UA	0.37***	0.029	0.12*
	(0.061)	(0.050)	(0.065)
Passenger station access in the UA (without zone municipality)	0.17***	0.0079	-0.021
	(0.049)	(0.034)	(0.052)
Distance to CBD			
Distance to main CBD in the UA	-0.12**	-0.025	-0.099***
	(0.050)	(0.037)	(0.032)
Average distance to all CBDs in the UA	-0.12**	-0.019	-0.098***
	(0.048)	(0.034)	(0.031)
Average distance to all municipalities in the UA	-0.14***	-0.038	-0.076*
	(0.045)	(0.039)	(0.042)

Notes: (i) Each line corresponds to the estimate of μ_t in equation (6); (ii) Standard errors in parentheses are clustered by zone; ***p$<$0.01, **p$<$0.05, *p$<$0.1; (iii) *Source*: GIS SG-CIV, BD-TOPO® and SIRENE.

Table 12: Urban geography and the impact of ZFU 2G on the growth of establishment creations by year

VARIABLES	2004	2005	2006
Severance			
Urban cut-offs between the neighborhood and the CBDs			
River cut-offs to main CBD in the UA	-0.073***	-0.0080	-0.072**
	(0.025)	(0.022)	(0.029)
River cut-offs per CBD in the UA	-0.092***	-0.028	-0.063
	(0.031)	(0.035)	(0.039)
Average river cut-offs to all CBDs in the UA	-0.093***	-0.028	-0.064
	(0.032)	(0.036)	(0.039)
Expressway cut-offs to main CBD in the UA	-0.11***	-0.0059	-0.055
	(0.033)	(0.036)	(0.039)
Expressway cut-offs per CBD in the UA	-0.12***	-0.021	-0.070*
	(0.033)	(0.034)	(0.038)
Average expressway cut-offs to all CBDs in the UA	-0.12***	-0.024	-0.067*
	(0.033)	(0.035)	(0.038)
Impassable road cut-offs to main CBD in the UA	-0.095***	0.0054	-0.060
	(0.032)	(0.029)	(0.040)
Impassable road cut-offs per CBD in the UA	-0.12***	-0.017	-0.070*
	(0.034)	(0.031)	(0.039)
Average impassable road cut-offs to all CBDs in the UA	-0.12***	-0.018	-0.065*
	(0.033)	(0.031)	(0.039)
Railroad cut-offs to main CBD in the UA	-0.14***	-0.0030	0.012
	(0.034)	(0.043)	(0.030)
Railroad cut-offs per CBD in the UA	-0.12***	-0.050	-0.059
	(0.036)	(0.033)	(0.042)
Average railroad cut-offs to all CBDs in the UA	-0.13***	-0.051	-0.054
	(0.036)	(0.032)	(0.042)
Severance at the border			
Road severance at the border (busy roads)	-0.15***	0.099***	-0.11**
	(0.051)	(0.037)	(0.048)
Road severance at the border (big roads)	-0.085*	0.069*	-0.078
	(0.043)	(0.041)	(0.064)
Road severance at the border (expressways)	-0.049	0.033	-0.071
	(0.043)	(0.043)	(0.054)
Road severance at the border (impassable roads)	-0.058	0.070	-0.038
	(0.054)	(0.043)	(0.070)
Railroad severance at the border	0.12**	0.017	0.080*
	(0.050)	(0.049)	(0.046)
Accessibility			
Distance to transportation			
Distance to closest passenger station	-0.17**	0.070	-0.13*
	(0.079)	(0.060)	(0.075)
Distance to closest highway junction	-0.041	0.0071	-0.018
	(0.035)	(0.025)	(0.040)
Distance to closest airport	0.063	0.063*	-0.013
	(0.044)	(0.034)	(0.060)
Distance to closest international airport	0.10**	0.079*	-0.024
	(0.041)	(0.043)	(0.058)
Catchment area			
Number of parking lots less than 500m away from zone	0.0069	0.038	-0.022
	(0.045)	(0.026)	(0.050)
% Zone less than 500m away from a passenger station	0.087*	0.0010	0.10***
	(0.049)	(0.032)	(0.037)
Number of passenger stations less than 500m away from zone	0.11**	0.014	0.083**
	(0.050)	(0.024)	(0.036)
Centrality			
Market potentials			
Population access in the UA	0.20**	0.10	-0.0090
	(0.100)	(0.065)	(0.10)
Population access in the UA (without zone municipality)	0.11**	0.035	0.010
	(0.045)	(0.037)	(0.049)
Road access in the UA	0.27**	0.17*	-0.093
	(0.13)	(0.096)	(0.15)
Road access in the UA (without zone municipality)	0.17***	0.058	-0.0014
	(0.046)	(0.046)	(0.066)
Road (weighted) access in the UA	0.28**	0.16*	-0.085
	(0.13)	(0.093)	(0.15)
Road (weighted) access in the UA (without zone municipality)	0.17***	0.056	0.0045
	(0.046)	(0.046)	(0.065)
Passenger station access in the UA	0.33***	0.0048	0.084
	(0.058)	(0.068)	(0.095)
Passenger station access in the UA (without zone municipality)	0.12***	0.024	-0.019
	(0.046)	(0.031)	(0.053)
Distance to CBD			
Distance to main CBD in the UA	-0.10**	-0.022	-0.088**
	(0.046)	(0.038)	(0.039)
Average distance to all CBDs in the UA	-0.10**	-0.012	-0.092**
	(0.044)	(0.034)	(0.037)
Average distance to all municipalities in the UA	-0.12***	-0.034	-0.059
	(0.042)	(0.041)	(0.050)

Notes: (i) Each line corresponds to the estimate of μ_t in equation (6); (ii) Standard errors in parentheses are clustered by zone; ***p<0.01, **p<0.05, *p<0.1; (iii) *Source*: GIS SG-CIV, BD-TOPO® and SIRENE.

Table 13: Urban geography and the impact of ZFU 2G on the growth of establishment transfers by year

VARIABLES	2004	2005	2006
Severance			
Urban cut-offs between the neighborhood and the CBDs			
River cut-offs to main CBD in the UA	-0.11**	-0.032	-0.045
	(0.042)	(0.042)	(0.035)
River cut-offs per CBD in the UA	-0.092*	-0.036	-0.043
	(0.047)	(0.049)	(0.044)
Average river cut-offs to all CBDs in the UA	-0.088*	-0.035	-0.038
	(0.047)	(0.050)	(0.045)
Expressway cut-offs to main CBD in the UA	-0.12**	-0.063	-0.030
	(0.059)	(0.074)	(0.053)
Expressway cut-offs per CBD in the UA	-0.15**	-0.077	-0.057
	(0.058)	(0.072)	(0.055)
Average expressway cut-offs to all CBDs in the UA	-0.14**	-0.072	-0.060
	(0.058)	(0.070)	(0.054)
Impassable road cut-offs to main CBD in the UA	-0.16**	-0.030	-0.012
	(0.064)	(0.064)	(0.058)
Impassable road cut-offs per CBD in the UA	-0.19***	-0.045	-0.046
	(0.063)	(0.066)	(0.057)
Average impassable road cut-offs to all CBDs in the UA	-0.19***	-0.043	-0.048
	(0.062)	(0.067)	(0.058)
Railroad cut-offs to main CBD in the UA	-0.098	-0.084	-0.059
	(0.060)	(0.071)	(0.056)
Railroad cut-offs per CBD in the UA	-0.11*	-0.044	-0.081
	(0.054)	(0.062)	(0.052)
Average railroad cut-offs to all CBDs in the UA	-0.11**	-0.046	-0.085
	(0.055)	(0.065)	(0.055)
Severance at the border			
Road severance at the border (busy roads)	-0.22***	-0.053	0.057
	(0.051)	(0.091)	(0.084)
Road severance at the border (big roads)	-0.081	0.036	0.091
	(0.11)	(0.091)	(0.11)
Road severance at the border (expressways)	-0.037	0.068	-0.0078
	(0.075)	(0.091)	(0.066)
Road severance at the border (impassable roads)	-0.10	-0.045	0.14
	(0.083)	(0.10)	(0.089)
Railroad severance at the border	0.028	-0.21***	0.14*
	(0.098)	(0.067)	(0.077)
Accessibility			
Distance to transportation			
Distance to closest passenger station	-0.040	0.073	0.0071
	(0.11)	(0.14)	(0.13)
Distance to closest highway junction	-0.13*	0.050	-0.14**
	(0.079)	(0.077)	(0.060)
Distance to closest airport	0.042	-0.025	0.018
	(0.050)	(0.13)	(0.080)
Distance to closest international airport	0.10*	0.0089	0.17**
	(0.060)	(0.11)	(0.084)
Catchment area			
Number of parking lots less than 500m away from zone	-0.025	0.032	0.069
	(0.062)	(0.071)	(0.060)
% Zone less than 500m away from a passenger station	0.025	-0.017	0.098
	(0.084)	(0.082)	(0.065)
Number of passenger stations less than 500m away from zone	0.031	0.023	-0.014
	(0.050)	(0.065)	(0.062)
Centrality			
Market potentials			
Population access in the UA	0.21	0.088	0.035
	(0.13)	(0.19)	(0.18)
Population access in the UA (without zone municipality)	-0.030	-0.0060	-0.045
	(0.12)	(0.075)	(0.081)
Road access in the UA	0.24	0.13	-0.031
	(0.16)	(0.25)	(0.23)
Road access in the UA (without zone municipality)	0.090	0.073	0.024
	(0.10)	(0.089)	(0.11)
Road (weighted) access in the UA	0.25*	0.10	-0.012
	(0.15)	(0.24)	(0.21)
Road (weighted) access in the UA (without zone municipality)	0.10	0.064	0.016
	(0.097)	(0.090)	(0.11)
Passenger station access in the UA	0.31***	0.15	0.098
	(0.076)	(0.10)	(0.19)
Passenger station access in the UA (without zone municipality)	-0.012	-0.039	-0.048
	(0.068)	(0.071)	(0.079)
Distance to CBD			
Distance to main CBD in the UA	-0.13***	-0.011	-0.070
	(0.051)	(0.053)	(0.053)
Average distance to all CBDs in the UA	-0.13***	-0.0085	-0.055
	(0.050)	(0.052)	(0.052)
Average distance to all municipalities in the UA	-0.12**	-0.016	-0.092
	(0.060)	(0.062)	(0.062)

Notes: (i) Each line corresponds to the estimate of μ_t in equation (6); (ii) Standard errors in parentheses are clustered by zone; ***p<0.01, **p<0.05, *p<0.1; (iii) *Source*: GIS SG-CIV, BD-TOPO® and SIRENE.

Table 14: Urban geography and the impact of ZFU 2G on the growth of the ratio of new establishments inflows / stock by year

VARIABLES	2004	2005	2006
Severance			
Urban cut-offs between the neighborhood and the CBDs			
River cut-offs to main CBD in the UA	-0.015***	-0.0097	-0.019***
	(0.0052)	(0.0084)	(0.0062)
River cut-offs per CBD in the UA	-0.018***	-0.018*	-0.024***
	(0.0056)	(0.0099)	(0.0077)
Average river cut-offs to all CBDs in the UA	-0.018***	-0.017*	-0.024***
	(0.0055)	(0.0097)	(0.0076)
Expressway cut-offs to main CBD in the UA	-0.018***	-0.017*	-0.024**
	(0.0069)	(0.0091)	(0.0098)
Expressway cut-offs per CBD in the UA	-0.019**	-0.021**	-0.030***
	(0.0077)	(0.0093)	(0.0096)
Average expressway cut-offs to all CBDs in the UA	-0.018**	-0.021**	-0.029***
	(0.0076)	(0.0093)	(0.0095)
Impassable road cut-offs to main CBD in the UA	-0.014**	-0.013	-0.021**
	(0.0065)	(0.0087)	(0.0092)
Impassable road cut-offs per CBD in the UA	-0.017**	-0.019**	-0.027***
	(0.0071)	(0.0093)	(0.0097)
Average impassable road cut-offs to all CBDs in the UA	-0.017**	-0.019**	-0.027***
	(0.0071)	(0.0092)	(0.0098)
Railroad cut-offs to main CBD in the UA	-0.012*	-0.016	-0.017
	(0.0070)	(0.012)	(0.012)
Railroad cut-offs per CBD in the UA	-0.012	-0.021**	-0.030***
	(0.0079)	(0.0091)	(0.0092)
Average railroad cut-offs to all CBDs in the UA	-0.012	-0.022**	-0.031***
	(0.0083)	(0.0090)	(0.0094)
Severance at the border			
Road severance at the border (busy roads)	-0.021**	0.016	-0.010
	(0.0092)	(0.015)	(0.020)
Road severance at the border (big roads)	0.0047	0.038**	0.022
	(0.012)	(0.018)	(0.028)
Road severance at the border (expressways)	0.0063	0.037**	0.00031
	(0.012)	(0.019)	(0.019)
Road severance at the border (impassable roads)	0.0062	0.036**	0.034
	(0.011)	(0.018)	(0.026)
Railroad severance at the border	0.020	-0.0027	0.011
	(0.015)	(0.014)	(0.015)
Accessibility			
Distance to transportation			
Distance to closest passenger station	-0.020	0.0039	-0.012
	(0.021)	(0.021)	(0.029)
Distance to closest highway junction	-0.018**	-0.0014	-0.017
	(0.0071)	(0.0084)	(0.012)
Distance to closest airport	-0.012	0.019	0.010
	(0.0099)	(0.012)	(0.016)
Distance to closest international airport	-0.016	0.029	0.030
	(0.011)	(0.019)	(0.023)
Catchment area			
Number of parking lots less than 500m away from zone	0.0083	0.0065	0.028
	(0.0094)	(0.013)	(0.020)
% Zone less than 500m away from a passenger station	0.019*	0.0094	0.037*
	(0.011)	(0.013)	(0.020)
Number of passenger stations less than 500m away from zone	0.015*	0.0077	0.023**
	(0.0080)	(0.0073)	(0.011)
Centrality			
Market potentials			
Population access in the UA	0.017	0.059***	0.041
	(0.020)	(0.017)	(0.027)
Population access in the UA (without zone municipality)	0.0079	0.015	0.0037
	(0.018)	(0.020)	(0.016)
Road access in the UA	0.0085	0.079***	0.028
	(0.024)	(0.030)	(0.037)
Road access in the UA (without zone municipality)	0.0058	0.029	0.012
	(0.012)	(0.020)	(0.017)
Road (weighted) access in the UA	0.0099	0.079***	0.029
	(0.022)	(0.030)	(0.035)
Road (weighted) access in the UA (without zone municipality)	0.0050	0.029	0.010
	(0.012)	(0.020)	(0.016)
Passenger station access in the UA	0.025	0.028	0.045*
	(0.016)	(0.022)	(0.023)
Passenger station access in the UA (without zone municipality)	0.017	0.010	0.00091
	(0.019)	(0.019)	(0.018)
Distance to CBD			
Distance to main CBD in the UA	-0.016**	-0.019	-0.035***
	(0.0075)	(0.012)	(0.010)
Average distance to all CBDs in the UA	-0.015**	-0.017	-0.033***
	(0.0068)	(0.012)	(0.010)
Average distance to all municipalities in the UA	-0.014	-0.023*	-0.031***
	(0.0086)	(0.013)	(0.011)

Notes: (i) Each line corresponds to the estimate of μ_t in equation (6); (ii) Standard errors in parentheses are clustered by zone; ***p<0.01, **p<0.05, *p<0.1; (iii) *Source*: GIS SG-CIV, BD-TOPO® and SIRENE.

Table 15: Urban geography and the impact of ZFU 2G on the growth of total jobs creation by year

VARIABLES	2004	2005	2006
Severance			
Urban cut-offs between the neighborhood and the CBDs			
River cut-offs to main CBD in the UA	-0.030*	-0.070***	0.017
	(0.018)	(0.020)	(0.018)
River cut-offs per CBD in the UA	-0.030	-0.076***	0.014
	(0.022)	(0.020)	(0.021)
Average river cut-offs to all CBDs in the UA	-0.030	-0.076***	0.014
	(0.022)	(0.020)	(0.021)
Expressway cut-offs to main CBD in the UA	0.013	-0.095***	0.035
	(0.033)	(0.022)	(0.024)
Expressway cut-offs per CBD in the UA	0.020	-0.10***	0.023
	(0.031)	(0.023)	(0.025)
Average expressway cut-offs to all CBDs in the UA	0.018	-0.10***	0.023
	(0.031)	(0.022)	(0.025)
Impassable road cut-offs to main CBD in the UA	0.014	-0.086***	0.038
	(0.033)	(0.024)	(0.026)
Impassable road cut-offs per CBD in the UA	0.024	-0.097***	0.032
	(0.035)	(0.025)	(0.026)
Average impassable road cut-offs to all CBDs in the UA	0.021	-0.098***	0.030
	(0.034)	(0.025)	(0.026)
Railroad cut-offs to main CBD in the UA	0.020	-0.060**	0.0043
	(0.035)	(0.025)	(0.026)
Railroad cut-offs per CBD in the UA	0.028	-0.066***	0.016
	(0.030)	(0.024)	(0.026)
Average railroad cut-offs to all CBDs in the UA	0.029	-0.068***	0.014
	(0.030)	(0.025)	(0.027)
Severance at the border			
Road severance at the border (busy roads)	0.0021	-0.018	0.0052
	(0.037)	(0.036)	(0.039)
Road severance at the border (big roads)	0.030	-0.061	0.055
	(0.067)	(0.060)	(0.056)
Road severance at the border (expressways)	0.058	-0.016	-0.0024
	(0.044)	(0.042)	(0.044)
Road severance at the border (impassable roads)	0.0064	0.0071	0.025
	(0.053)	(0.049)	(0.050)
Railroad severance at the border	-0.035	0.029	0.0090
	(0.036)	(0.040)	(0.036)
Accessibility			
Distance to transportation			
Distance to closest passenger station	0.017	0.0033	-0.017
	(0.058)	(0.061)	(0.053)
Distance to closest highway junction	0.047	0.026	0.0070
	(0.030)	(0.039)	(0.022)
Distance to closest airport	-0.046	-0.010	0.011
	(0.033)	(0.030)	(0.025)
Distance to closest international airport	-0.082	0.027	0.019
	(0.053)	(0.054)	(0.043)
Catchment area			
Number of parking lots less than 500m away from zone	0.021	-0.062*	0.074**
	(0.047)	(0.035)	(0.033)
% Zone less than 500m away from a passenger station	0.0015	0.018	0.057
	(0.042)	(0.040)	(0.040)
Number of passenger stations less than 500m away from zone	0.017	0.017	0.030
	(0.037)	(0.024)	(0.023)
Centrality			
Market potentials			
Population access in the UA	-0.18*	0.19**	-0.086
	(0.10)	(0.084)	(0.061)
Population access in the UA (without zone municipality)	-0.031	0.11**	-0.027
	(0.057)	(0.046)	(0.037)
Road access in the UA	-0.22*	0.21**	-0.15**
	(0.12)	(0.097)	(0.070)
Road access in the UA (without zone municipality)	-0.077	0.089*	-0.047
	(0.057)	(0.054)	(0.038)
Road (weighted) access in the UA	-0.20*	0.19**	-0.14**
	(0.11)	(0.085)	(0.064)
Road (weighted) access in the UA (without zone municipality)	-0.073	0.081	-0.046
	(0.055)	(0.054)	(0.037)
Passenger station access in the UA	-0.089	0.037	0.0044
	(0.055)	(0.065)	(0.051)
Passenger station access in the UA (without zone municipality)	-0.013	0.11*	-0.029
	(0.066)	(0.058)	(0.037)
Distance to CBD			
Distance to main CBD in the UA	0.010	-0.094***	0.030
	(0.035)	(0.025)	(0.026)
Average distance to all CBDs in the UA	0.015	-0.092***	0.038
	(0.033)	(0.025)	(0.025)
Average distance to all municipalities in the UA	0.022	-0.10***	0.038
	(0.037)	(0.028)	(0.028)

Notes: (i) Each line corresponds to the estimate of μ_t in equation (6); (ii) Standard errors in parentheses are clustered by zone; ***p<0.01, **p<0.05, *p<0.1; (iii) *Source*: GIS SG-CIV, BD-TOPO® and DADS.

Table 16: Urban geography and the impact of ZFU 2G on the growth of hours worked in 2005 by sector

VARIABLES	Manufacturing	Health and social work
Severance		
Urban cut-offs between the neighborhood and the CBDs		
River cut-offs to main CBD in the UA	-0.054	-0.13***
	(0.059)	(0.038)
River cut-offs per CBD in the UA	-0.063	-0.13***
	(0.059)	(0.043)
Average river cut-offs to all CBDs in the UA	-0.061	-0.12***
	(0.059)	(0.043)
Expressway cut-offs to main CBD in the UA	-0.032	-0.12***
	(0.075)	(0.042)
Expressway cut-offs per CBD in the UA	-0.030	-0.14***
	(0.069)	(0.044)
Average expressway cut-offs to all CBDs in the UA	-0.033	-0.14***
	(0.069)	(0.043)
Impassable road cut-offs to main CBD in the UA	-0.0094	-0.12**
	(0.069)	(0.046)
Impassable road cut-offs per CBD in the UA	-0.00039	-0.12***
	(0.063)	(0.048)
Average impassable road cut-offs to all CBDs in the UA	-0.0066	-0.12***
	(0.064)	(0.048)
Railroad cut-offs to main CBD in the UA	-0.063	-0.11***
	(0.062)	(0.036)
Railroad cut-offs per CBD in the UA	-0.037	-0.13***
	(0.056)	(0.041)
Average railroad cut-offs to all CBDs in the UA	-0.037	-0.13***
	(0.056)	(0.041)
Severance at the border		
Road severance at the border (busy roads)	-0.013	-0.18***
	(0.100)	(0.066)
Road severance at the border (big roads)	0.037	-0.11
	(0.12)	(0.074)
Road severance at the border (expressways)	-0.049	-0.072
	(0.11)	(0.071)
Road severance at the border (impassable roads)	-0.027	-0.039
	(0.12)	(0.080)
Railroad severance at the border	-0.15*	0.067
	(0.079)	(0.073)
Accessibility		
Distance to transportation		
Distance to closest passenger station	0.019	0.070
	(0.090)	(0.13)
Distance to closest highway junction	-0.021	-0.097
	(0.043)	(0.060)
Distance to closest airport	0.017	-0.032
	(0.056)	(0.055)
Distance to closest international airport	0.055	-0.020
	(0.085)	(0.056)
Catchment area		
Number of parking lots less than 500m away from zone	0.26***	-0.089*
	(0.074)	(0.046)
% Zone less than 500m away from a passenger station	0.042	0.0049
	(0.11)	(0.059)
Number of passenger stations less than 500m away from zone	0.076	0.075
	(0.047)	(0.052)
Centrality		
Market potentials		
Population access in the UA	-0.029	0.24
	(0.14)	(0.15)
Population access in the UA (without zone municipality)	0.059	0.038
	(0.063)	(0.075)
Road access in the UA	-0.054	0.15
	(0.18)	(0.21)
Road access in the UA (without zone municipality)	0.022	0.061
	(0.073)	(0.095)
Road (weighted) access in the UA	-0.042	0.14
	(0.17)	(0.21)
Road (weighted) access in the UA (without zone municipality)	0.019	0.062
	(0.068)	(0.094)
Passenger station access in the UA	0.14	0.24
	(0.084)	(0.16)
Passenger station access in the UA (without zone municipality)	0.018	0.097
	(0.063)	(0.079)
Distance to CBD		
Distance to main CBD in the UA	-0.023	-0.13***
	(0.061)	(0.039)
Average distance to all CBDs in the UA	0.0029	-0.13***
	(0.058)	(0.038)
Average distance to all municipalities in the UA	-0.016	-0.12***
	(0.070)	(0.043)

Notes: (i) Each cell corresponds to the estimate of μ_{2005} in equation (6); (ii) Standard errors in parentheses are clustered by zone; ***p<0.01, **p<0.05, *p<0.1; (iii) *Source*: GIS SG-CIV, BD-TOPO® and DADS.