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Conference Paper

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53rd Congress of the European Regional Science Association: "Regional Integration: Europe, the Mediterranean and the World Economy", 27-31 August 2013, Palermo, Italy

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Moeller, Kristoffer (2013) : Culturally clustered or in the cloud? Location of internet start-ups in Berlin, 53rd Congress of the European Regional Science Association: "Regional Integration: Europe, the Mediterranean and the World Economy", 27-31 August 2013, Palermo, Italy, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

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Culturally clustered or in the cloud? Location of internet start-ups in Berlin*

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27th February 2013

Abstract

Knowledge based firms like IT companies do neither have a capital- nor a land intensive production. They predominantly rely on qualified labour and increasingly depend on the location of its (potential) employees. This would imply that firms follow its workers and not the other way around. Contributing to the literature of firm location and consumer cities I empirically test the amenity oriented firm location hypothesis. In particular I investigate whether Berlin internet start-up firms, representing a footloose knowledge-based service industry, locate at urban amenity-rich places. Identification builds on the sudden fall of the Berlin Wall. The intra-city analysis yields a significant impact of urban amenities on the location of internet start-up. A comparison with other service industries suggests that amenities are significant to the location choice of creative sectors whereas no effect can be observed for non-creative firms.

Keywords: firm location, urban amenities, internet start-ups, Berlin

JEL classification: R30, D22, L26

Draft Version!

*Acknowledgements: Everyone involved. Please download the full paper version including the figures here: https://www.dropbox.com/s/jib7noqoyszy6q5/Moeller_CCC_2.pdf

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1 Introduction

In the past, manufacturing firm location was characterised by classic/first nature type location factors like natural advantages, cheap land and labour, or later physical infrastructure. Today's knowledge based economy, however, is based on the idea of generating and quickly spreading innovation. IT companies for instance do neither have a capital- nor a land intensive production. They are highly footloose thanks to portable computers and wireless internet. Due to these technological improvements as well as a significant reduction of travel and transport costs over the last decades the New Economy firms and its employees are theoretically able to live anywhere [Kotkin, 2000]. As qualified labour becomes the most important (and solely) input for service firms these companies increasingly depend on the location of its (potential) employees. This would imply that firms follow its workers and not the other way around [Kolko, 1999].

Highly qualified and "creative" individuals have a strong preference for a rich social and cultural life [Florida, 2002]. Looking at social science, these creative heads can be assigned to a new social milieu which has evolved over the last years. This has been labelled "movers and shakers" ("Experimentalisten") being the unconventional creative avantgarde, the new Bohemia [Sinus Sociovision GmbH, 2011]. Members of this milieu are very individualistic, digitally networked and highly mobile in a geographical as well as in a mental scope. I consider this milieu as the driver of a currently observable start-up boom in Berlin and expect them to be highly attracted by a distinct provision of urban amenities.

Since the provision of urban amenities like theatres, bars or clubs involve high fixed costs a critical mass is needed which is easier reached in dense urban areas. Cities have therefore been more and more regarded as a place of consumption than of production [Glaeser et al., 2001]. Cities are not only endowed with a higher level of amenities, their citizens also consume urban amenities more often [Glaeser and Gottlieb, 2006].

If service firms follow skilled labour those firms act as amenity maximiser when deciding where to locate [Gottlieb, 1995]. Amenities can therefore become an important economic asset for a city. A conclusion Lee and Nathan [2010] also make when investigating how cultural diversity drives innovation in London. Even though the important role of amenities is highly accepted in urban economic literature most amenities tested empirically do not explain the whole story. Quality of life indices based on hedonic methods implicitly control for amenities but do not allow for the direct determination of a singular effect [Gabriel and Rosenthal, 2004, Chen and Rosenthal, 2008]. Measures of local amenities like distance from a major coast and average annual precipitation [Kolko, 1999] or other climate amenities like July/January temperature [Glaeser et al., 2010] have definitely the advantage of being purely exogenous but ignore the discussion on urban amenities. It is questionable whether these amenities are able to attract a young footloose generation – the movers and shakers – founding and working for internet firms. As economic conditions and technology changes, society changes as well.

Measures which might be more appropriate are for instance the cuisine variety a location offers [Schiff, 2011], or music nodes and clubs [Ahlfeldt, 2011b]. However, since urban amenities are man-made, they are highly endogenous. Estimates thus suffer most likely from severe omitted variable biases. This might be a reason why endogenous amenities are seldom subject of economic analyses. One of the few exceptions builds for instance Falck et al. [2011] who try to circumvent this problem by instrumenting cultural amenities using baroque opera houses. Ahlfeldt [2012] exploits a novel dataset of geo-tagged photos uploaded to online communities in order to capture "urbanity" - a composed measure of urban amenities. His estimates for Berlin and London yield an indirect utility elasticity with respect to urbanity of 1%.

Based on the theoretical consideration I contribute to the literature of firm location and consumer cities by testing the amenity oriented firm location hypothesis: Knowledge-based service industries locate at urban amenity-rich places. I follow the urban amenity definition

proposed by Glaeser et al. [2001]. They distinguish between four types of urban amenities: (1) local service/consumption goods like restaurants, bars, theatres etc., (2) aesthetics and physical appearance, (3) locally provided public goods like schools, and (4) speed in terms of travel time (for instance due to a developed transport infrastructure). In particular, I concentrate on the first type of urban amenities. Throughout the paper I label the composite of local consumption goods as cultural amenities.

I will test the stated hypotheses empirically by looking at the rise of the internet industry in Berlin over the last years. First of all, internet firms provide a perfect example of the knowledge-based service sector which is highly footloose. Secondly, potential labourers as well as the firms' entrepreneurs can be characterised as relatively young, highly qualified and somehow creative individuals who are expected to be attracted by urban/cultural amenities. Thirdly, limiting the analysis on start-ups enables the assumption of taking the existing economic environment as given. The location choice is expected to be unconstrained by previous firm decisions [Rosenthal and Strange, 2003]. And finally and most importantly, I use the sudden fall of the Berlin Wall as a source of exogenous variation. Nowadays, Berlin is globally known as having an open, creative and artistic environment which is regarded as fertile ground for innovation. A specific subculture has evolved in the aftermath of German reunification which still strongly affects today's cultural scene. The subcultural development originates from the open, chaotic and tolerant environment after the fall of the Berlin Wall. The "wild east" with its political vacuum and abandoned places became home of artists and creatives [Schwannhäußer, 2007]. I make use of this very particular subcultural development and use proximity to the former Wall as well as squat density as instrumental variables (IV) for the presumably endogenous current endowment of cultural amenities. The applied instruments are assumed to affect the location of internet start-ups only indirectly via the cultural amenity channel. The exclusionary restriction is strengthened by the time dimension and the fact that the internet was not used commercially/by the general public during the fall of the Iron Curtain but only became popular during the end of the 1990s.¹

Previous studies particularly looking at the location of IT firms mainly concentrate on the co-location of those firms due to agglomeration economies. Knowledge spillovers have for instance been found for the computer gaming industry [Claussen et al., 2010] but also for software firms in Oslo [Isaksen, 2004] and the Silicon Valley [Kolko, 2001]. However, there is a lack of studies investigating the role of cultural amenities on the location decision of firms. It is the author's intention to fill this gap by controlling for cultural amenities in a within-city analysis. To the best of the author's knowledge there are only a few within-city studies when explaining the location of firms. An exception builds Rosenthal and Strange [2005] who look into the geography of entrepreneurship in the New York Metropolitan Area. Another example is the work by Arzaghi and Henderson [2008] who investigate the location choice of art galleries. They also use New York City for their intra-urban analysis and find evidence for a clustering of galleries. Within-city analyses generally try to understand the location choice on a micro-level and thus might reveal specific forces being at work only at a very fine spatial level.

The next section provides an overview over the development of the internet industry in Berlin as well as the city's cultural development. I give more reasons why I use Berlin as a case study. I also provide arguments in favour of an intra-urban analysis. In section three, I present a theoretic model of a footloose start-up to motivate my empirical strategy which I develop in section four. I also provide an overview of the data I use and report the empirical results. Previewing my results, I conclude in the final section that cultural amenities indeed affect the internet start-up location.

¹In fact, in 1993 the National Center for Supercomputing Applications (NCSA) at the University of Illinois Urbana-Champaign released Mosaic - the first browser which made the internet available for the general public Vetter et al. [1994].

2 Internet industry in Berlin

Today, the “Nerd Revolution” [tip, 2011] describes the growing number of internet startups being founded not by business students but by computer developers. Berlin seems to provide a hub function for this latest development, sometimes already compared to Silicon Valley. There are more than 5,700 firms with over 50,000 employees working in the IT and communication sector [Berlin Business Location Center, 2012a]. A lot of international investors, mainly venture capitalists and business angels, not just visit Berlin but move to the city to financially support and collaborate with local startups. Moreover, experts predict further growth of this fairly young sector and even expect that the next Facebook will come from Berlin.

To get an idea of the movement’s origins this section sums up Berlin’s recent history with respect to the main research questions and provides arguments in favour of an intra-urban analysis.

2.1 (Sub-) Cultural rise after re-unification

The fall of the Berlin Wall in 1989, which had run through the heart of pre-WWII Berlin, reshaped the city’s geography. Former border locations like West Berlin’s Kreuzberg as well as today’s Mitte and Prenzlauer Berg in the East were all of a sudden in the new geographical centre of the city, causing a re-newed interest in the historical CBD. Looking at rents, Ahlfeldt et al. [2012b] for instance observe a re-emergence of the former rent gradient towards East Berlin’s district of Mitte.

Due to the fall of the Iron Curtain Berlin’s population suddenly rose from 2.1 million (West) or 1.3 million (East) in 1989 to 3.4 million people. This implies a sudden increase in economic mass and market size. Moreover, the accessibility to a wide range of physical amenities (parks, water bodies), social amenities (friends and family) and cultural amenities experienced a rise as well. Even though market players originally came from different economic systems a higher number of residents decreases the cost of provision of certain cultural and public goods. This is of special interest for service industries providing local non-tradable goods since they are characterised by high consumer transport costs as well as by a required critical mass due to high fixed costs [Schiff, 2011]. Assuming that customer’s willingness to travel to e.g. restaurants can be described by a steep spatial decay, these places will cluster in central areas additionally allowing for a greater variety.

Due to its history and its renewed status as Germany capital², Berlin is by definition a tourist magnet. Tourists have an additional interest in services like restaurants, bars and theatres, especially in the historic CBD. Hence, the reborn historical centre offers new potentials for services due to the improved accessibility.

Owed to underinvestments of the local GDR government into historical built-up structure a lot of East Berlin buildings were abandoned, rents were low. Empty houses, the political vacuum and the new tolerant, open environment drew in artists as well as squatters³ (e.g. in Prenzlauer Berg or Mainzer Straße in Friedrichshain) and eventually students. Abandoned ware houses and industry halls provided free/open space for artists and cultural events. A lot of techno clubs were established in empty buildings. Night life was young and vivid. This pioneering development has been increasingly commercialised over the years: In summer 1999 the techno parade “Love Parade” attracted more than 1.5 million visitors. Techno clubs like Berghain located in the district of Friedrichshain ranked as number one techno club in the world in 2009 [DJ Mag, 2009]. Nowadays, the city attracts easyjetters [Rapp, 2009] from all

²On June 20th, 1991 the German Parliament decided to move the capital of reunified Germany from Bonn back to Berlin.

³Which yet might be considered as the pioneers of today’s gentrification [Clay, 1979, Friedrichs, 2000].

over Europe. However, this young, mobile and often highly skilled generation does not always return to their home countries but stay in Berlin, settle and look for jobs.

Amongst four universities, eleven technical colleges, a great number of research institutes, Europe's biggest fibre glass network as well as a wide range of sector specific exhibitions (e.g. Berlin Web Week, Droidcon, re:publica, Social Media Week etc.), it is the quality of life which is an often quoted arguments for start-ups locating in Berlin. As O'Leary, partner at the venture capitalist Earlybird, puts it:

"There is no other place in the world where I can find such a bunch of creativity and freedom."

His company as well as fellow venture capital funds invested more than in 136 mio. Euros during the first three quarters of 2012.

2.2 Berlin discovers the internet

By mid-1999 the German internet industry was lagging behind the US economy by five years [McGrane, 2000]. It was exactly that year when German internet economy kicked off after the Samwer brothers sold their first German internet startup to a US company. After having experienced the work and management environment in Silicon Valley, in 1999 the three brothers moved back to Cologne, Germany and later on founded the online auction house alando.de in a backyard in Berlin-Kreuzberg. Only six months later they already sold the company for US-\$43 million to eBay. This can be regarded as the start of the Berlin internet economy. From that moment on Berlin transformed itself to Germany's Mecca for young internet entrepreneurs.

Quickly agglomeration economies came into play. From the very beginning, the Samwer brothers tried to establish strong linkages within the Berlin founder community. Startup Lounges, weekly breakfast rounds and seminars are supposed to foster the exchange of ideas and experience regarding the founding process. Following classic Marshallian externalities, spillovers and a highly specialised labour market support the development of the local internet industry. In a sector, which is characterised by mainly young companies bearing high risks to fail, the exchange of experiences is of even greater importance.

Additionally, the young sector was spurred by important financial as well as technological developments: The introduction of the "Neuer Markt" (1997) – German equivalent to US Nasdaq – made it easier for the new startups to raise capital from venture capitalists. Moreover, internet became cheaper, faster and with the introduction of Apple's iBook in 1999 even footloose. The iBook was the first portable computer with integrated wireless network (WiFi) which did not only allow for saving costs on local cable network infrastructure but also from that moment on programmers were able to work from anywhere. Companies like SoundCloud for instance even started off in bars (Sankt Oberholz), enjoying the social environment and saving on renting office space. Silicon Valley's garages are Berlin's bars.

According to the US technology magazine Wired [McGrane, 2000], the very first internet startups settled in Berlin mainly for two reasons: (i) cheap rents in centrally located backyards, and (ii) a cultural scenery and night life which was as vivid and unshaped as the entrepreneurs themselves; both being the outcome of the reunification process.

During the last years an increasing number of internet start-ups settled in Berlin making the city the nation's biggest home of internet firms. According to the online database provided by the start-up network *Gründerszene* [2012], Berlin, with more than 416 internet start-ups, is by far the sector's most important city, followed by Hamburg (125) and Munich (114, see also Figure ?? on page ??). Despite it's leading position it's still Berlin where the Chamber of Industry and Commerce (IHK) recognizes the strongest growth in innovative web firms.

To sum up, the birth of the internet economy does not look like being the result of an historic accident [Krugman, 2010]. Recent anecdotal evidence rather tells us that the initial

firm births are highly linked with Berlin's rich endowment of very distinct cultural amenities. The first-movers are then expected to be followed by new start-ups which on the one hand also want to benefit from amenities and on the other hand from agglomeration economies of the newly created internet cluster. Given the above described development Berlin serves as a perfect city to empirically test the stated firm amenity maximizer hypothesis.

2.3 An intra-urban analysis

Most researchers investigate the determinants of firm location on a regional or metropolitan level. There are substantially less intra-urban analyses. An exception builds Rosenthal and Strange [2005] as well as Arzaghi and Henderson [2008] who both use census tract level data of New York City. Within-city analyses, however, provide interesting insights when it comes to the assessment of location factors. First of all, the availability of highly disaggregated data on a city level implies a high geographic variation compared to an analysis which is based on a country's variations in regions or provinces as this number is usually comparably small. Secondly, there are a lot of location factors which only affect locations at a very close distance. Especially, when thinking of cultural amenities, it is reasonable to assume that their influence diminishes with a steep decay. And thirdly, as the paper's empirical approach builds on a conditional logit model, it must be ensured that the assumption of independence of irrelevant alternatives holds. An entrepreneur must theoretically be able to take all locations for setting-up his firm into consideration; a reasonable assumption in an intra-urban setting.

After having made a case for using Berlin for an intra-urban analysis I will present a model of a footloose start-up.

3 Footloose start-up model

This section introduces a model of a footloose start-up in order to derive an estimable equation. It is based on the firm model introduced by Crozet et al. [2004] which has also been used by Brühlhart et al. [2012].

The idea is to derive a profit function which describes a firm's profitability depending on its location. The firm location choice model assumes an investor setting up a new firm. The founder then decides on a firm location given a set of alternatives. The profit function consists of factors varying over location i and across sectors j like the income and price elasticity of demand.

Quantity is set to be the strategic variable of a representative firm. Suppose that consumer's demand (=firm's supply) relies on a Cobb-Douglas utility function and is given by:

$$Q_{ij} = \frac{\alpha_j m_i^{\gamma_j}}{p_{ij}^{\delta_j}}, \quad (1)$$

with α_j as the share of income spent on the particular good, m_i denotes the (exogenous) income of the consumers at location i , γ_j is the income elasticity and δ_j the price elasticity for sector j . The demand is satisfied by the firms at a price p_{ij} . This is a simplifying assumption as in the world of internet start-ups not only workers and firms are footloose but also consumers, i.e. demand. Now suppose that firms have identical production cost when producing in the same location; a reasonable assumption for internet industries. Following that assumption, individual firms' quantities will be equal.

$$Q_{ij} = N_{ij} q_{ij}, \quad (2)$$

where N_{ij} is the number of firms on the market. Ignoring any taxes, a representative firm's profit function producing and selling at location i is given by:

$$\pi_{ij} = (p_{ij} - c_{ij})q_{ij}, \quad (3)$$

where c_{ij} is a unit production cost function. It is now possible to derive the total equilibrium quantity Q_{ij}^* as well as the equilibrium price p_{ij}^* :⁴

$$Q_{ij}^* = N_{ij}q_{ij} = \frac{\alpha_j m_i^{\gamma_j}}{p_{ij}^{\delta_j}} \left(\frac{N_{ij}\delta_j - 1}{c_{ij}\delta_j} \right)^{\delta_j} \quad (4)$$

$$p_{ij}^* = \frac{N_{ij}\delta_j}{N_{ij}\delta_j - 1} c_{ij} \quad (5)$$

The following profit function can be obtained when plugging in p_{ij} and q_{ij} :

$$\pi_{ij} = \frac{\alpha_j m_i^{\gamma_j}}{N_{ij}^{\delta_j+1}} \left(\frac{\delta_j}{N_{ij}\delta_j - 1} c_{ij} \right)^{(1-\delta_j)} \quad (6)$$

Assuming a price elasticity greater than one, $\delta_j > 1$, profits increase with consumers' expenditure/market size and decrease with production costs and number of active firms/competition.

Let the unit cost be defined as function of firms (N_{ij}) wages (w_{ij}), rent (r_i) and location invariant capital cost (k):

$$c_i = N_{ij}^{-\theta_N} w_{ij}^{\theta_w} r_i^{\theta_r} k^{\theta_k}, \quad (7)$$

where θ_N , θ_w , θ_r and θ_k denote the respective input shares. Unit cost rise with wages, office rents and capital cost and fall with the number of other firms due to agglomeration economies. The wage is determined by vector E which is a composite of (unobservable) individual specific characteristics like education, work experience etc and a location variant amenity shifter A_i capturing the stock of cultural amenities location i is surrounded with. For simplicity, I assume that E is location invariant and identical over firms ⁵:

$$w_{ij} = EA_i^{-\tau_j}, \text{ with } \tau_j > 0, \quad (8)$$

where τ_j describes how strongly amenities are capitalised into wages and varies across sector j . Wages might decline with the endowment of amenities for two reasons: (i) workers are willing to work at lower wages if they get compensated by amenities, and (ii) spill-overs due to face-to-face contact in bars, coffee shops etc. The latter idea is closely related to [Storper and Venables \[2004\]](#) who consider the face-to-face contact as a key element of urban concentration. Especially creative industries require the exchange of ideas and information. Urban amenities like bars provide an external location to have meetings. A third-party location might be preferred due to a lack of office space (especially for young start-ups), its neutral character or due to the preference for a more relaxed, creative, stimulating environment. Substituting wages into the unit cost leaves us with:

$$c_{ij} = N_{ij}^{-\theta_N} (EA_i^{-\tau_j})^{\theta_w} r_i^{\theta_r} k^{\theta_k} \quad (9)$$

Plugging the unit cost into the maximised profit function and assuming a sufficiently large number of firms yield the following expression:

$$\pi_{ij} = \alpha_j m_i^{\gamma_j} N_{ij}^{\theta_N(\delta_j-1)-2} r_i^{\theta_r(1-\delta_j)} (EA_i^{-\tau_j})^{\theta_w(1-\delta_j)} k^{\theta_k(1-\delta_j)} \frac{\delta_j^{1-\delta_j}}{\delta_j - 1} \quad (10)$$

⁴See [Crozet et al. \[2004\]](#) for a more detailed derivation.

⁵Admittedly a strong assumption but reasonable when taking into account the relatively high homogeneity of the sector (all young, IT specialists etc.).

Log-linearizing the maximised profit function results in:

$$\begin{aligned} \ln \pi_{ij} = & \ln \alpha_j + \gamma_j \ln m_i + (\theta_N(\delta_j - 1) - 2) + \theta_w(1 - \delta_j) \ln E - \tau_j \theta_w(1 - \delta_j) \ln A_i \\ & + \theta_r(1 - \delta_j) \ln r_i + \theta_k(1 - \delta_j) \ln k + (1 - \delta_j) \ln \frac{\delta_j}{1 - \delta_j} \end{aligned} \quad (11)$$

Assuming homogenous sectors and mobile firms profits are the same at every location. Spatial equilibrium then requires amenities to be capitalised into wages and rents. The location choice is independent of any amenity endowment. Empirically, amenities and rents should have no significant effect.

$$\frac{\partial \pi_i}{\partial A_i} = 0 \quad (12)$$

However, due to firm heterogeneity the results might be different for different sectors. Since I am particularly focussing on internet start-ups the following key hypothesis can be formulated:

$$\frac{\partial \pi_{ij}}{\partial A_i} > 0 \quad (13)$$

A footloose start-up acts as amenity maximizer when deciding on a firm location if profits rise with cultural amenities.

4 Empirical analysis

4.1 Empirical approach

Based on the log-linearized version of the profit function developed in Section 3 the following estimable equation can be formulated:

$$\ln \pi_{ij} = \beta_0 + \beta_{1i} + \beta_{2i} \ln N_{ij} + \beta_{3i} \ln A_i + \beta_{4i} \ln r_i + \beta_{5i} \ln G_{ij} + \ln v_i \quad (14)$$

Capital cost k , and income are dropped as both factors are spatially not restricted to the city of Berlin. Potential consumers are web users all around the world and making it impossible to control for their income. Employee characteristics E are also not included as regressors due the above stated reasons. G_i stands for a number of controls which are briefly going to be discussed later on. The equation can be estimated by a conditional logit model when the added stochastic term $\ln v_i$ is assumed to follow an i.i.d. extreme-value type 1 distribution.

The conditional logit model serves as a well-established econometric framework when it comes to the estimation of firm location decisions. It is based on [McFadden \[1974\]](#) random utility maximization which was adapted to a random profit maximization problem by [Carlton \[1983\]](#). Consider an investor or entrepreneur j which chooses a location i out of a set of spatial choices I for setting up a new firm. The profit π_{ij} the entrepreneur j derives at location i is composed by a deterministic and a stochastic term:

$$\pi_{ij} = U_{ij} + \varepsilon_{ij} \quad (15)$$

Location i will be preferred over k if:

$$\pi_{ij} > \pi_{ik}, \forall k, k \neq i \quad (16)$$

The probability that location i is chosen by the entrepreneur is given by:

$$P_{ij} = \text{Prob}(\pi_{ij} > \pi_{ik}), \forall k, k \neq i \quad (17)$$

Assuming independently distributed error terms and additionally following a Weibull distribution results in the conditional logit formulation

$$P_{ij} = \frac{\exp(U_{ij})}{\sum_{k=1}^K \exp(U_{ik})}, \quad (18)$$

where the deterministic component U_{ij} is assumed to be a linear combination of explanatory variables.

In the past, conditional logit models could not consider the full set of location choices when the set was large. To avoid cumbersome estimations [Guimarães et al. \[2000\]](#) used smaller choice sets which were selected randomly. The size of choice sets increases with the fineness of the spatial level like statistical blocks as in this paper. To be able to use all information and allow for the replicability of the results, [Guimarães et al. \[2003\]](#) have shown that it is possible to obtain equivalent coefficients for the conditional logit model when estimating it using a Poisson count model.

By assuming that each location decision is determined by a vector of choice specific attributes which are common to groups of individuals (or in this case of firms), the log-likelihood function of the conditional logit model is identical to the Poisson log-likelihood up to a constant. It is therefore possible to estimate the profit function using a Poisson model with the number of firms in each location n_i as dependent variable.

$$E(n_{ij}) = \lambda_{ij} = \exp(\beta_0 + \beta_{1i} + \beta_{2i}N_{ij} + \beta_{3i}A_i + \beta_{4i}r_i + \beta_{5i}G_{ij}) \quad (19)$$

The conditional logit model relies on the independence of irrelevant alternatives (IIA) assumption. This means that consistent estimates require the stochastic terms to be independent across locations. The location decision between two alternatives is not allowed to change when a third alternative location is added or changed. An entrepreneur must therefore theoretically be able to compare all locations available in the choice set. The finer the spatial level, the more alternatives there are, increasing the likelihood of violating the IAA. This is in line with [Figueiredo et al. \[2002\]](#) who argue in their paper on location decisions of Portuguese entrepreneurs that entrepreneurs choose firm locations close to where they live. They know the area better and finding a new location implies additional search costs. That is also why I investigate the location choice problem in an intra-city framework. I assume that within a city an entrepreneur is able to compare all potential locations.

Another violation of the IIA assumption might occur when there are unobserved location characteristics that are spatially correlated. I therefore include location fixed effects to control for any spatially-fixed unobservables by adding a set of location dummies d_d [[Brühlhart et al., 2012](#)].

As established, the above derived profit function can be estimated by a Poisson model. The Poisson estimator, however, relies on the strong assumption that the conditional mean equals the conditional variance, $\text{VAR}(Y|X) \propto E(Y|X)$. In practice this assumption is often violated and the data at hand suffer from overdispersion, i.e. the variance exceeds the expected value. Very often there is also a larger number of zeros as described by the Poisson distribution. I therefore weaken the Poisson assumption and apply a Poisson Pseudo-Maximum Likelihood (PPML) estimator as originally suggested by [McCullagh and Nelder \[1989\]](#) and later by [Santos Silva and Tenreyro \[2006\]](#).

A PPML estimator requires two specifications: the functional form of the conditional expectation $E(Y|X)$ and of the conditional variance $\text{VAR}(Y|X)$. The conditional mean is defined as above (plus the district dummies):

$$E(n_{ij} | N_{ij}A_i r_i G_{ij} d_d) = \exp(\beta_0 + \beta_{1i} + \beta_{2i}N_{ij} + \beta_{3i}A_i + \beta_{4i}r_i + \beta_{5i}G_{ij} + \beta_{6i}d_d) \quad (20)$$

Assuming the conditional variance to be proportional to the conditional mean, $\text{VAR}(Y | X) \propto \text{E}(Y | X)$, it is possible to estimate β by solving the following set of first-order-conditions:

$$\sum_{n=1}^N [n_{ij} - \exp(\tilde{\beta}_0 + \tilde{\beta}_{1i} + \tilde{\beta}_{2i}N_{ij} + \tilde{\beta}_{3i}A_i + \tilde{\beta}_{4i}r_i + \tilde{\beta}_{5i}G_{ij} + \tilde{\beta}_{6i}d_d)]N_iA_i r_i G_i d_d = 0 \quad (21)$$

$\tilde{\beta}$ s are a Generalized Method of Moments (GMM) estimators and consistent when the conditional mean is correctly specified. If the assumption about the proportional relation between conditional expectation and variance is violated the standard errors of the estimates are inefficient, whereas the estimated coefficients are not affected. All inference has therefore been based on Eicker-White robust standard errors.

The way the weights have been defined, the PML estimator is numerically equal to the Poisson pseudo-maximum likelihood (PPML) estimator. Therefore I obtain consistent estimates based on a Poisson likelihood function without requiring the dependent variable to be made of integers [Gourieroux et al., 1984]. Building on large sample asymptotic, the PPML approach has been proven to be efficient and robust [Gourieroux et al., 1984, Santos Silva and Tenreiro, 2006, 2011].

4.2 Identification

The inclusion of cultural amenities in the empirical model raises obvious endogeneity concerns mainly because their existence highly depends on demand from economic subjects. There are two potential types of endogeneity. Firstly, estimates might suffer from a simultaneity bias. It becomes difficult to disentangle whether cultural amenities attract firms or whether causality runs the other way around. Secondly, the likelihood of unobservables in the error term which affect both internet start-ups and amenities is very high. Therefore identification becomes crucial.

The suggested identification strategy to deal with the risen endogeneity concerns is twofold. First of all, I control for location fixed effects by adding a set of location dummies. Due to the spatial scope of the expected unobservable fixed effects, the geographic bodies of the location controls must be sufficiently fine. I use voting precincts of 2008 to control for fixed effects. There are 1,201 precincts for 15,937 statistical blocks. Voting precincts are by definition supposed to reflect homogeneity in terms of demographics [Berliner Parlament, 2008]. They have previously been used by Ahlfeldt [2012] as unit of analysis to represent a self-contained neighbourhood. The voting precincts are therefore expected to soak up any unobservable fixed effects.

I secondly follow an instrumental variable strategy. I use the fall of the Berlin Wall as natural experiment and exploit German reunification as source of exogenous variation. The historic event was not foreseen by any market players and can therefore be regarded as an exogenous shock [Ahlfeldt et al., 2012b]. In particular, I use distance to the former Berlin Wall as main instrument for cultural amenities. The idea is that proximity to the former border explains the spatial endowment of current cultural amenities sufficiently well. Municipalities like Prenzlauer Berg, Mitte, Friedrichshain and Kreuzberg which were originally located in the periphery of either East or West Berlin all of a sudden became central places. There is ethnologic evidence that a specific subculture has evolved in the aftermath of German reunification, predominantly in the “wild east” with its political vacuum and abandoned places [Schwannhäußer, 2007]. Former border areas became home of artists, creatives, students and squatters. Bars and clubs opened. The identifying assumption is that proximity to Wall has no direct effect on the location choice of internet start-up, only indirectly via the amenity channel. The exclusionary restriction is backed-up by the time dimension and the fact that the internet was not used by the general public during the beginning of the 1990s.

For robustness checks I suggest a second set of instruments which is admittedly weaker in terms of the exclusionary restriction. Following the previous line of argumentation I use the location of squatted buildings since 1987 as well as historical cultural amenities of 1998/1999 to instrument the current level of amenities. Squatters reflect the immigration into the new open, tolerant areas. Together with artists and students they are considered to be the pioneers of the gentrification [Clay, 1979, Friedrichs, 2000]. They are the first ones to open (sub-)cultural bars and clubs and to develop the area. Historic cultural amenities directly capture the young, open techno scene. The idea is that today’s cultural life originates from a subculture which developed itself during the 1990s provoked by German reunification. Even though I consider this latter set of instrumental variables as weaker in terms of the exclusionary restriction they at least allow to circumvent simultaneity. Squatted houses and historic amenities are a result of the reunification years and no direct link to internet firms can be established. By that time, the number of internet users was still very small; mobile computers and wireless internet connect scarcely available.

Independent of the applied instrument, the IV PPML estimator solves the following first order condition [Tenreiro, 2007]:

$$\sum_{n=1}^N \left[n_i - \exp(Y_i \bar{\beta}) \right] z_i = 0 \quad (22)$$

As a final remark, I note that the proposed footloose start-up model does not contain any variable taking into account localisation economies. However, it is often argued how important agglomeration economies especially for knowledge-based firms are, benefitting from classic Marshallian externalities like information spillovers and a highly specialised labour market [Kolko, 2001, Rosenthal and Strange, 2003, Isaksen, 2004, Rosenthal and Strange, 2005, Claussen et al., 2010]. I therefore expect internet start-ups to co-locate but treat clustering as given. As mentioned earlier, using the location choice of start-ups allows for the assumption that start-ups take the existing economic environment as given. It is not the paper’s aim to find evidence for agglomeration economies but to analyze how cultural amenities affect the firm location choice. The aforementioned identification strategy is expected to deal with unobserved agglomeration forces.

4.3 Data

4.3.1 Dependent variable

To determine the location factors of internet start-ups I use the number of web firms per statistical housing block as dependent variable. The regressand’s count data character further encourages the Poisson estimation approach. The statistical blocks become the unit of analysis. The firm data originate from two sources: As primary source, I extracted firm information (including their postal addresses) of all firms listed in the online database provided by [Gründerszene](#) [2012]. Gründerszene is a magazine as well as an online platform for the German web economy and its start-ups which was founded in 2006. The firm addresses were geocoded and processed in a geographic information system (GIS) environment. As a second source, I used the Berlin Startup map which maps Berlin Web 2.0 start-ups in Berlin. It is accessible via the [Berlin Business Location Center](#) [2012b], a public business promoter and location marketing office owned by the state of Berlin. The data of the two different sources were merged and double entries deleted. The sample represents a total of 497 internet startups being listed in June 2012.

4.3.2 Cultural amenities

Data on current cultural amenities were taken from [OpenStreetMap \[2013\]](#). It is argued that the potential self-selection by uploading spatial data to OpenStreetMap reflects the people's perception of its surrounding not causing any biases but revealing preferences. I take into account main stream as well as subcultural amenities. Cultural amenities include bars/pubs, cinemas, theatres, clubs, operas, beer gardens, cafés, restaurants and art places.

Not the pure number of amenities is of people's interest but the mass of cultural amenities they are surrounded by. A potential amenity indicator should therefore be able to capture the number of amenities within a certain proximity whereas amenities nearby should get a stronger weight. Since the definition of the amenity measure already implies a certain assumption and hence affects the results I briefly discuss three different measures I use. First of all, I compute kernel densities around each point representing a cultural amenity [[Silverman, 1986](#)], applying a radius of 2 km. This radius goes back to [Gibbons and Machin \[2005\]](#) who predict a distance of 2 km as being the maximum distance people are willing to walk to the nearest station and has already been used in the context of cultural amenities by [Ahlfeldt et al. \[2012a\]](#). Even though the density measure fulfills the above stated requirements estimate interpretation is rather abstract and not intuitive. I therefore secondly employ a gravity based accessibility measure as suggested by [[Fujita and Ogawa, 1982](#)]:

$$A(i) = \sum_j A_j e^{-bd(i,j)}, i \neq j \text{ and } d_{ii} = \frac{1}{3} \frac{\sqrt{Area_i}}{\pi}, \quad (23)$$

where the access to cultural amenities in block i , $A(i)$, is defined by the number of other amenities at all other surrounding locations j spatially discounted by a decay parameter b and $d(i, j)$ a measure of distance between i and j . As public transport plays a major role in moving people in big and dense cities, Euclidian distances only provide a rough estimation of proximity to other firms. However, replicating the transport network places a strong weight on the location of public transport station which most likely pick up correlated unobservables. I therefore stick to the straight line distances between block centroids. Assuming that start-ups are only attracted by amenities in their close neighbourhood I apply a distance decay parameter of two which is supposed to capture walking speed [[Ahlfeldt, 2011a](#)]. For robustness tests I thirdly create buffer rings of various radiuses around each block centroid and use the number of amenities which fall inside a ring.

To sum up, each of the measures suggested come with certain advantages and disadvantages. The application of all three of them help to get a better understanding of the forces at work. Their application is hence regarded as robustness check controlling whether the estimates are independent of the measure chosen. The distribution of internet start-ups (points) and density of cultural amenities is illustrated by Figure ?? on page ??.

Proximity to the Berlin Wall is computed for every block centroid. I calculate straight line distances as well as an potentiality measure similar to the access of cultural amenities as indicated by equation (23). To provide illustrative evidence for today's remarkably strong endowment of former border location with cultural amenities, Figure ?? on page ?? illustrates the Berlin Wall jointly with access to amenities.

For the secondary set of instruments I use historical cultural amenities of 1998/1999 and squatted houses since 1987. Mainstream bars, clubs, theatres and restaurants were extracted from [Siebenhaar et al. \[1998\]](#), a guide book especially designed for young people on behalf of the state of Berlin. A detailed and ethnologic analysis of Berlin's subculture and the origins of the Berlin techno underground scene is provided by [Schwannhäußer \[2007\]](#). She refers to a website [Verblichene Locations \[1999\]](#) listing the locations of subcultural Berlin and its events before the gentrification process kicked in. Squatted buildings are retrieved from [Hausbesetzungs Geschichte Berlin \[2010\]](#). The extracted data were geocoded and processed as described above.

4.3.3 Additional regressors and controls

According to the empirical specification (21) the number of internet start-ups is not only determined by cultural amenities but also by the number of other firms inside a block, the rent as well as a set of control variables. The number of firms is proxied by the total employment inside a block. The variable can be considered to capture localised general agglomeration/urbanization economies [Arzaghi and Henderson, 2008] as a large number of employees suggests a strong economic activity. The coefficient is expected to be positive if localised agglomeration economies positively impact on internet firms. A negative coefficient would reflect the competitive aspect of being closely located to other firms. As noted above internet firms offer online services and users are not required to be physically close. In contrast to offline firms I do not control for any other market potentiality in the classic sense. Anecdotal evidence sees low rents as one of the main drivers of the Berlin web 2.0 boom. I use rent data⁶ from 2010 Immobilien Scout [2012] to assess today's role of rents for the location decision of start-ups.

I additionally control for further location factors which might determine the location of young internet firms. I control for the number of immigrants per block. Areas characterised by migration are expected to attract young entrepreneurs as they are signal of cultural variety and tolerance. Data come from the statistical office Berlin Brandenburg [Amt für Statistik Berlin-Brandenburg, 2011a,b]. Berlin is home of a large number of knowledge-creating and -spreading institutions. Young start-ups are often founded as spin-offs of universities. I therefore expect a positive relation between firm location and proximity to universities and research institutes. To test this I calculate Euclidian distances between all statistical blocks and research institutes/universities in a GIS environment.

Among cultural amenities, entrepreneurs might also be attracted by natural amenities. Proximities to water bodies and green spaces are therefore computed. Additionally, young founders might also have a need for exercising after work. I hence control for the number sport facilities inside a block. These facilities include gyms, outdoor sport fields, swimming baths, and tennis courts [Gelbe Seiten Deutschland, 2012, OpenStreetMap, 2013]. Transport accessibility is generally another important factor for the location of firms. For internet start-ups, however, transport serves rather for commuting reasons than in terms of market accessibility since the output is usually a service good which is consumed "online". I therefore control for accessibility to public transport infrastructure including the bus, tram, underground and light rail network. For the multicollinearity reasons stated before I am unable to capture the network via a potentiality measure but use station densities of the different transport modes separately [BVG, 2006].⁷ Moreover, I control for the disamenity effect of noise originating from trains, underground trains on overground tracks as well as tram and street noise. The data are taken from maps published by the Berlin Senate Department for Urban Development [2007] which indicates the level of noise on a highly disaggregated 10x10 meter grids. To control for spatial trends I also add X- and Y-coordinates to the estimation model.

I note that there are numerous co-variates like for instance the number of sport facilities or of migrants inside are block which ignore any spatial relation to the surrounding. For example a block might very well be located inside a tolerant neighbourhood even though the block's number of migrants is low. However, the inclusion of various measures relying on the same functional specification might cause multicollinearity among regressors which results in biased estimation results [Thill and Kim, 2005].

⁶In the current version of the paper, I must rely on residential instead of office rents due to data availability.

⁷Still the likelihood of suffering from multi-collinearity cannot entirely be rejected. However, computed variance inflation factors (VIF) for the transport measures are all below ten which is considered to be the threshold value for harmful collinearity [Kennedy, 2003].

4.3.4 Alternative service firms

The selection of branches of other knowledge-based service industries is based on an overview provided by [Eickelpasch et al. \[2009\]](#) who analyse development perspectives for the service sector in eastern Germany. I hence rerun the benchmark model of the internet start-ups for consultancies, lawyers, insurance companies, financial advisors, agencies, engineering offices and architects. I consult the yellow pages for Berlin [[Gelbe Seiten Deutschland, 2012](#)] to obtain the postal addresses of all service firms. The data were processed in the same manner as the start-up information.

4.4 Results

4.4.1 Internet start-ups

To test the implications of the footloose start-up model I begin the analysis by estimating the regression model as outlined by equation (21). Table 1 on page 24 reports the estimates for four different specifications.

I initially abstract from equation (21) by ignoring rents and other firms and by only focussing on the effect of cultural amenities on the location of internet start-ups (column 1). I use the log of the amenities to facilitate the interpretation⁸. The transformation reduces the total number of observation by 87 to 15,850 remaining blocks. Cultural amenities significantly (at a 1% level) influence the location choice of internet start-ups. In particular, a 1% increase in amenity density raises the probability of a firm locating in a block by almost 1.6%. Adding the employment and rent variable lowers the attractive force of cultural amenities only slightly (column 2). Employment positively affects the location of internet start-ups indicating the presence of localised agglomeration economies. Against general intuition, rents have a positive on the firm location. This might be due to the fact that rents are higher in areas which are endowed with specific amenities like centrality, a prestigious surrounding or public transport for which specification (2) does not control for. Indeed, rents become insignificant when more determinants are added in the later models.

It is not only cultural amenities but there are all kinds of amenities which affect the location of people and firms. I therefore add a set of control variables in specification (3). The likelihood of internet start-ups locating at a block due to the endowment with cultural amenities almost halves to 0.8%. Moving on to the estimates of the additional set of controls, migration positively affects the location of young web firms. This is very much in line with the creative class defined by [Florida \[2002\]](#), being highly attracted by a tolerant surrounding. The migration effect stays robust in all specifications. As internet start-ups are knowledge based firms exchange with research institutions might be important. However, proximities to research institutes and to universities are insignificant throughout all specifications. In specification (3) distance to university drives firms even out. It was said in the introduction that venture capitalists move to Berlin as well and co-locate close to their recipients. This is found to be highly significant. Estimates indicate that the probability of a start-up locating inside a block decreases by between 0.35% and 0.65% per km distance from venture capitalists. Of the two natural amenities distance to nearest water bodies and to green space, only the first one is significant and positively attracts web firms. The provision of sport facilities is also found to positively affect firm location whereas exercising can be seen as a complement to cultural amenities in terms of leisure consumption. Statistical significance only holds for specification (3) though. One unfortunate drawback of the sports measure is that it only takes into account the number of facilities inside a block due to the aforementioned multi-collinearity concerns. The transport controls are all insignificant except bus stops which have a positive effect on firm location

⁸I also estimate the non-logarithmised density of cultural amenities in robustness tests later on.

and underground stations with a negative impact. However, all transport variables become insignificant in the more demanding specification (4). Noise disamenities have mixed effects. While noise originating from the underground running on overground tracks positively affect start-up location in specification (3), the variable becomes insignificant in model (4). Not intuitively, noise caused by the light rail system, trains and simple streets noise drive firms out. Additionally controls for spatial trends (by the X-/Y-Coordinates) are all insignificant with one exception in specification (3): Firms seem to be slightly more attracted to the east (positive correlation with the X-Coordinate). However, this trend becomes insignificant in the more demanding model.

Column (4) finally introduces fixed effects at the voting precinct level and more importantly instruments (proximity to wall, squat density) for the endogenous amenity variable. Cultural amenities continue to have a positive impact on the location decision of internet start-ups. A 1% increase in amenity density causes the likelihood of a firm location to rise by 1.4% with a significance level, however, dropping down to about 6%. Even though the instrumented model yields a lower statistical significance the economic significance is almost as large as in the baseline specification (1). As already indicated by the interpretation of column (3), a number of controls becomes insignificant. This is probably due to the fact that the location fixed effect dummies soak up a lot of the variation. The control variables which remain significant are in line with general expectations indicating that start-ups are attracted by economic activity (employment, proximity to capital), tolerant (migration) and pleasing locations (proximity to water, noise disamenities). I consider this last specification as the most demanding one and will refer to it as benchmark model for the subsequent analysis.

Instrument validity relies on two requirements: (i) instruments need to be valid, i.e. uncorrelated with the error term, and (ii) relevant in terms of prediction power, so they require a high correlation with the endogenous regressors. The first requirement can generally not be tested. However, when the model is overidentified and there are more instruments than endogenous variables one can perform a test of overidentifying restrictions. As I instrument current cultural amenities by two different instruments, I test the null hypothesis that the applied instruments are jointly valid assuming that at least one instrument is exogenous. The computed Hansen's J statistic (OVERID) and its p-values (OVERIDP) do not reject the validity of the instruments. The evaluation of an instrument's strength is based on the F-statistic of the first stage regressions shown in column (1) of Table 3 on page 29. The first column refers to the benchmark specification whereas the remaining columns belong to robustness checks discussed later. [Stock et al. \[2002\]](#) argue that the F-statistic should be greater than ten for a set of instruments to be relevant. The benchmark first-stage regression passes this threshold.

4.4.2 Robustness

To ensure that the results are not driven by the applied indicators I re-run the benchmark specification using different measures of cultural amenity endowment and different instruments (Table 2 on page 27). I first use the non-logarithmised density of current cultural amenities (column 1) which allows me to run the model on the full sample of 15,937 statistical blocks. The amenity density variable becomes slightly more significant (at a 5% level) and still positively affects the location choice of web firms. In columns (2)-(4) I capture the stock of current cultural amenities by a potentiality measure with a distance decay of two which is supposed to capture walking speed (as suggested by [Ahlfeldt \[2011a\]](#)). The inherent assumption is that entrepreneurs are only attracted by amenities in their close neighbourhood. I first instrument current amenities using the benchmark instruments distance to Berlin Wall and squat density (specification 2). I then use distance to Wall and squat potentiality (specification 3) and both Berlin Wall and squat potentiality (specification 4) as instrumental variables. The instrumented

cultural amenity estimates are all positive and significant at the 5% level, except for specification (4) which is only significant at at 10% level.

Finally, I create buffer rings of several distances around a block centroid and count the number of cultural amenities inside a ring. I hereby follow [Arzaghi and Henderson \[2008\]](#) who apply a similar indicator to capture the access to nearby advertising agencies as agglomeration measure. I define five (column 5) and four (column 6) rings moving out in increments of 500 metres up to 2,000 metres whereas specification (5) has an additional ring of 250 metres. The ring approach comes with the advantage of being intuitive to interpret. However, the variables might quite likely suffer from unobservables fixed effects in the error terms despite the use of voting precincts dummies and instruments. For data reasons, I am additionally only able to use the supposedly weakest set of instruments, the count of historical cultural amenities (1998/99) inside a ring. Moreover, the definition of the blocks is relatively heterogenous compared to the definition of New York City census tracts [[Arzaghi and Henderson, 2008](#)]. There might exist large blocks with the smallest buffer rings around the centroid being still inside the block. Estimates are therefore to be interpreted with special care. Estimates for the two models are very comparable. One additional cultural amenities in a ring between 500 and 1000 metres around a block centroid increases the probability of a local firm location by 1.5%. In contrast, in the neighbouring ring (1000-1500m) the effect is negative and the likelihood decreases by 1% (1.2%) whereas all other ring variables are insignificant. The estimates suggest that an increase in the endowment with cultural amenities would reinforce a small clustering effect around existing amenities. Despite sufficiently small VIF statistics it is not entirely possible to reject the presence of multi-collinearity.

All instruments fulfill the overidentifying restrictions indicating their statistical validity. Referring to the first stage regressions (Table 3 on page 29) all instruments are also sufficiently strong. The instruments are all individually significant except distance to Berlin Wall in specification (3) instrumenting access to cultural amenities. Interestingly, proximity to the Berlin Wall is negatively related to amenities in column (2) and (4). Summing up the results of the robustness checks using alternative measures provide evidence for the attractive role cultural amenities play for the location choice of internet start-ups. However, I consider none of the models to be as good as the benchmark specification with respect to the identification.

4.4.3 Other service firms

The paper tries to establish an empirical link between cultural amenities and firm location. It was argued that internet start-ups provide a perfect example for a footloose and knowledge-based firm. However, there might be other service sectors also being affected by an area's endowment with cultural amenities. I therefore re-estimate the benchmark model using seven alternative service firms instead of the original internet start-ups. I hereby assume that these firms do not face any cost of moving and re-adjusting their location when attracted by other places which offer a better set of location factors. This admittedly is a simplifying assumption, however, compared to manufacturing industries, the moving of service firms usually only involves the relocation of office equipment. Estimates are reported in Table 4 on page 32.

Cultural amenities now only have an effect on the location of three out of the seven industries. In particular, cultural amenities play only a significant role for the location of agencies and architects. An 1% increase in density raises the probability of an agency (architect) locating at a location by 0.8% (1.1%). This is about 0.6 (0.3) percentage points less than for internet start-ups. In contrast, law firms experience on average a negative effect and seem to get driven out by amenities. Their likelihood decreases by 1.3% compared to web start-ups. I cannot observe any statistically significant effects for consultancies, engineering offices, financial advisors and insurance companies.

The interpretation of the remaining variables is limited as they are not at the centre of this research. The majority of the coefficient estimates are comparable to the benchmark model using internet start-ups as dependent variable. I therefore briefly report the most striking differences. Rent estimates yield a diverse but rather positive effect on firm location (insignificant for insurance companies). Service firm location is generally independent of the proximity to research institutions, an intuitive result considering the research un-intensity of the firm selection. A surprising exception builds the location of law firms. Interestingly, sport facilities positively affects all firms whereas the picture of the transport role becomes rather mixed-up again. The importance of light rail stations stands out and affect almost all firms except agencies. Architects and consultancies have a significant tendency to locate in the west, consultancies, engineering companies and law firms in the south of the city.

Finally turning to the validity of the instruments, six out of the seven model specifications pass the test of overidentification. For architects the null hypothesis of joint instrument validity must be rejected. As said earlier, the overidentification test needs to be interpreted with care since it relies on the assumption that at least one instrument is exogenous. The test therefore only serves as rough indicator for the validity of the applied instruments. First-stage regressions are reported in Table 5 on page 34. Theoretically, the first stage regression models for the latter seven service industries should be equivalent to the one for the internet start-up model. Practically however, the inclusion of voting precinct dummies slightly varies due to the distinct distribution of firms over the city. Dummies had to be dropped if the number of blocks equipped with firms was too low in order for the IV GMM model to converge. Nonetheless, the first stage estimates turn out to be very similar. All F-statistic confirm the IVs' relevance for all models.

The estimates indicate that the endowment of an areas with cultural amenities cannot be regarded as a generalizable location determinant. Moreover, the footloose start-up model as built above cannot be applied to any economic sector. In fact, it is possible to distinguish agencies and architects from the other firms by the type of service they offer and by the type of employees. The two industries can both be characterised and classified into a rather creative sector whereas the other service types used in the analysis offer rather conservative services like advisories or consultancies. The movers and shakers are more likely to be found among web firms and architects than among lawyers. This first group literally is the “creative class” [Florida, 2002].

5 Conclusion

Cities have recently experienced a renaissance. People and firms are increasingly attracted by dense locations. Dense locations are usually characterised by a high endowment of cultural amenities like theatres, bars, restaurants or clubs. The provision of these amenities relies on high fixed costs turning cities into centres of consumption. It was argued that especially young, highly-qualified and creative individuals are attracted by urban amenities. Knowledge-based service firms being highly dependent on qualified labour are therefore expected to act as amenity maximisers and to locate in amenity-rich areas.

I test this hypothesis by looking at the evolving internet start-up sector in Berlin which serves an example for knowledge-based service firms. Following an instrumental variable approach which makes use of the fall of the Berlin Wall as a natural experiment, I try to fill the gap of lacking studies empirically assessing the role of urban amenities. It was shown that cultural amenities positively impact on the location of start-ups; a one percent increase in amenity density raises the probability of a start-up location by about 1.4%. These results are proven to be robust by estimating various specifications in terms of amenity measures and instruments applied.

It was also shown that the results do not generally apply to all service types. Conservative

service sectors like financial advisories or insurance companies are not found to be affected by an area's endowment with cultural amenities. Law firms are even found to be driven out by urban amenities. It is rather creative branches like architects, agencies and above all internet firms which act as amenity maximiser. The paper therefore also provides indirect evidence on the existence of an urban "buzz" [Storper and Venables, 2004]. Concentrated urban areas are characterised by a specific atmosphere (e.g. originating from cultural amenities or tolerance) which affects very specific industries and others not. I find that these affected industries are closely related to the creative class.

Entrepreneurs are generally regarded as highly beneficial for a country's economy, both by economists as well as by politicians. They create new jobs, promote innovation and economic growth. Especially the IT- and software sector is considered to be a key sector with great potentials. Hence there are lot of different political initiatives to support entrepreneurs like e.g. providing cheap office space, developing cheap credit programs or offering workshops on how to found a company. The results of this paper enable a different perspective on how to promote entrepreneurs. It was shown that cultural amenities, a city's diversity and tolerance play an important role in attracting start-ups. This suggests an implementation of cultural political initiatives in economic policy. Even though subcultural diversity might not be anticipated as economically beneficial in the short-run its destruction might, however, stop attracting footloose creative heads in the long-run.

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Table 1: Estimation results

	(1)	(2)	(3)	(4)
	start-up	start-up	start-up	start-up
log cult amen.	1.571*** (0.106)	1.432*** (0.106)	0.799*** (0.184)	1.417* (0.753)
employment		0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
rent		0.109*** (0.041)	0.100 (0.068)	0.038 (0.081)
migrants			0.004*** (0.001)	0.005*** (0.001)
dist research			0.054 (0.126)	0.028 (0.350)
dist university			0.307*** (0.110)	0.300 (0.299)
dist VC			-0.347*** (0.083)	-0.652*** (0.248)
dist to water			-0.562*** (0.111)	-1.124*** (0.329)
dist to green			0.744 (0.542)	0.789 (0.693)
sport			0.192** (0.076)	0.138 (0.098)
bus dens			0.105** (0.047)	-0.104 (0.130)
light rail dens			0.428 (0.487)	0.149 (0.911)
underground dens			-0.458* (0.240)	-0.377 (0.611)
tram dens			0.139** (0.060)	0.140 (0.209)
U/tram noise			0.011** (0.005)	0.010 (0.008)
train noise			-0.045*** (0.012)	-0.059*** (0.016)
street noise			-0.021** (0.009)	-0.021* (0.011)
x-coord			0.087** (0.036)	0.130 (0.118)
y-coord			0.034 (0.033)	0.111 (0.192)
cons	-8.312*** (0.405)	-8.756*** (0.434)	-6.916*** (1.722)	-9.232 (7.438)
Controls	N	N	Y	Y
FE	N	N	N	Y
IV	N	N	N	Y
N	15850	15850	15850	15850
OVERID				0.831

OVERIDP	0.362
Standard errors in parentheses	
Instruments: distance to Wall, squat density	
* p<0.1, ** p<0.05, *** p<0.01	

Table 2: Estimation results

	(1) start-up	(2) start-up	(3) start-up	(4) start-up	(5) start-up	(6) start-up
cult amen. (dens)	0.022** (0.014)					
cult amen. (pot.)		0.014** (0.007)	0.089** (0.045)	0.130* (0.071)		
cult (ring 250m)					0.017 (0.023)	
cult (ring 500m)					-0.015 (0.015)	-0.006 (0.008)
cult (ring 1000m)					0.015*** (0.005)	0.015** (0.006)
cult (ring 1500m)					-0.010* (0.006)	-0.012* (0.006)
cult (ring 2000m)					0.001 (0.005)	0.003 (0.005)
employment	0.000*** (0.000)	0.000*** (0.000)	0.001** (0.000)	0.001** (0.000)	0.000*** (0.000)	0.000*** (0.000)
rent	0.033 (0.076)	0.033 (0.076)	-0.019 (0.089)	-0.026 (0.106)	0.027 (0.088)	0.034 (0.092)
migrants						

	0.005*** (0.001)	0.004*** (0.001)	0.003** (0.002)	0.003 (0.002)	0.005*** (0.001)	0.005*** (0.001)
dist research						
	-0.210 (0.259)	-0.204 (0.257)	-0.114 (0.518)	-0.097 (0.815)	-0.064 (0.282)	-0.164 (0.301)
dist university						
	0.195 (0.269)	0.200 (0.265)	1.095 (0.950)	1.548 (1.405)	0.241 (0.302)	0.222 (0.337)
dist VC						
	-0.815*** (0.181)	-0.868*** (0.168)	-0.794 (0.484)	-0.899 (0.862)	-0.939** (0.384)	-1.046*** (0.389)
dist to water						
	-0.944*** (0.286)	-1.012*** (0.294)	-1.365 (0.888)	-1.754 (1.419)	-1.107*** (0.332)	-1.093*** (0.339)
dist to green						
	0.579 (0.602)	0.579 (0.602)	0.330 (0.614)	0.187 (0.811)	1.166* (0.707)	1.370* (0.746)
sport						
	0.133 (0.090)	0.123 (0.093)	-0.019 (0.156)	-0.101 (0.225)	0.121 (0.114)	0.117 (0.108)
bus dens						
	-0.103 (0.100)	-0.088 (0.088)	-0.149 (0.190)	-0.132 (0.251)	0.006 (0.116)	0.010 (0.127)
light rail dens						
	0.521 (0.946)	0.289 (0.863)	3.686 (2.849)	5.116 (4.293)	0.152 (1.086)	-0.028 (1.177)
underground dens						
	-0.140 (0.553)	-0.075 (0.537)	-2.220 (1.889)	-3.597 (2.526)	0.037 (0.716)	-0.117 (0.739)
tram dens						
	0.173 (0.160)	0.230* (0.140)	-0.324 (0.291)	-0.465 (0.465)	0.270 (0.213)	0.321 (0.220)

U/Tram noise	0.009 (0.007)	0.008 (0.007)	-0.010 (0.013)	-0.019 (0.018)	0.013 (0.010)	0.014 (0.010)
train noise	-0.062*** (0.016)	-0.062*** (0.016)	-0.076*** (0.024)	-0.084*** (0.033)	-0.059*** (0.022)	-0.067*** (0.023)
street noise	-0.017 (0.010)	-0.016 (0.010)	-0.000 (0.017)	-0.001 (0.020)	-0.026* (0.015)	-0.022 (0.013)
x-coord	0.190** (0.097)	0.179* (0.094)	0.361 (0.304)	0.449 (0.477)	0.135 (0.130)	0.131 (0.135)
y-coord	0.054 (0.128)	0.062 (0.132)	0.372 (0.375)	0.502 (0.598)	0.126 (0.114)	0.116 (0.126)
const	-5.109 (4.335)	-4.995 (4.259)	-22.957 (15.205)	-32.415 (26.278)	-5.140 (4.268)	-4.256 (4.331)
Controls	Y	Y	Y	Y	Y	Y
FE	Y	Y	Y	Y	Y	Y
IV	Y	Y	Y	Y	Y	Y
N	15937	15937	15937	15937	15937	15937
OVERID	0.015	0.013	0.007	0.359	0.079	0.170
OVERIDP	0.901	0.909	0.931	0.549	0.779	0.680

Standard errors in parentheses

Instruments: (1) and (2) distance to Wall, squat density, (3) distance to Wall, squat potentiality, (4) Wall and squat potentiality, (5) and (6) distance to Wall, number of historic cultural amenities

Please note: Cultural amenity density in (1) is not in logs.

* p<0.1, ** p<0.05, *** p<0.01

Table 3: First stage regressions

	(1) log cult dens	(2) cult dens	(3) cult pot	(4) cult pot	(5) cult pot
dist to Wall	-0.027*** (0.002)	0.071*** (0.021)	0.025 (0.032)	0.280*** (0.037)	
squat density	0.091*** (0.008)	7.656*** (0.102)	10.909*** (0.160)		
squat potent.				0.959*** (0.029)	0.853*** (0.030)
Wall potent.					0.313*** (0.067)
employment	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
rent	0.014*** (0.003)	0.407*** (0.032)	0.637*** (0.051)	0.774*** (0.056)	0.803*** (0.056)
migrants	0.001*** (0.000)	0.011*** (0.001)	0.024*** (0.002)	0.028*** (0.002)	0.026*** (0.002)
dist research	-0.049*** (0.004)	0.007 (0.046)	-0.146** (0.072)	-0.287*** (0.079)	-0.256*** (0.080)
dist university	0.028*** (0.004)	0.587*** (0.043)	0.875*** (0.068)	1.139*** (0.076)	1.147*** (0.077)
dist VC	-0.055*** (0.003)	-0.542*** (0.033)	-0.916*** (0.052)	-0.605*** (0.063)	-0.619*** (0.063)
dist to water	-0.090*** (0.005)	-0.619*** (0.056)	-0.933*** (0.088)	-1.113*** (0.098)	-1.087*** (0.098)
dist to green	-0.248*** (0.018)	2.615*** (0.219)	4.352*** (0.344)	3.675*** (0.379)	3.425*** (0.378)
sport	0.022** (0.009)	-0.242** (0.116)	-0.297 (0.183)	-0.275 (0.201)	-0.257 (0.201)
bus dens	0.110*** (0.002)	0.247*** (0.028)	0.271*** (0.044)	0.310*** (0.048)	0.159*** (0.047)
light rail dens	1.451***	8.240***	12.273***	9.138***	9.660***

	(0.038)	(0.462)	(0.727)	(0.802)	(0.803)
underground dens	1.343***	26.706***	39.408***	38.295***	38.702***
	(0.019)	(0.228)	(0.358)	(0.434)	(0.441)
tram dens	0.263***	1.834***	1.975***	3.543***	3.558***
	(0.005)	(0.066)	(0.104)	(0.112)	(0.113)
U/tram noise	-0.000	-0.043***	-0.032***	-0.080***	-0.075***
	(0.000)	(0.005)	(0.007)	(0.008)	(0.008)
train noise	-0.000	0.040***	0.063***	0.075***	0.075***
	(0.001)	(0.007)	(0.011)	(0.013)	(0.013)
street noise	-0.000	-0.073***	-0.095***	-0.172***	-0.175***
	(0.001)	(0.009)	(0.014)	(0.015)	(0.015)
x-coord	-0.013***	0.075***	0.134***	0.004	-0.042*
	(0.001)	(0.014)	(0.023)	(0.026)	(0.025)
y-coord	-0.021***	-0.011	0.002	-0.076***	-0.123***
	(0.001)	(0.011)	(0.017)	(0.019)	(0.018)
const	1.283***	-3.077***	-3.408***	-4.765***	0.207
	(0.069)	(0.839)	(1.320)	(1.452)	(1.297)
FE	Y	Y	Y	Y	Y
F	591.839	868.492	788.610	633.863	632.245
r2	0.856	0.897	0.888	0.864	0.864

Standard errors in parentheses

* p<0.1, ** p<0.05, *** p<0.01

Table 4: Estimation results

	(1) agency	(2) finance	(3) architect	(4) consultant	(5) engineer	(6) insurance	(7) law firm
log cult amen. (dens)	0.791* (0.469)	-0.587 (0.610)	1.103*** (0.333)	-0.064 (0.310)	-0.287 (0.378)	-0.406 (0.406)	-1.336*** (0.176)
employment	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
rent	0.129** (0.054)	0.108** (0.054)	0.194*** (0.032)	0.180*** (0.035)	0.078** (0.033)	0.052 (0.050)	0.284*** (0.035)
migrants	0.003*** (0.001)	0.004*** (0.001)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.001)	0.003*** (0.000)
dist research	0.120 (0.171)	0.089 (0.204)	0.179** (0.081)	0.036 (0.071)	-0.039 (0.091)	-0.067 (0.111)	-0.202*** (0.073)
dist university	0.093 (0.103)	0.034 (0.141)	0.094 (0.061)	-0.026 (0.049)	-0.012 (0.062)	0.051 (0.076)	-0.204*** (0.073)
dist VC	-0.231** (0.107)	-0.279 (0.182)	-0.135* (0.071)	-0.167*** (0.064)	-0.193*** (0.069)	-0.158* (0.092)	-0.324*** (0.055)
dist to water	-0.246** (0.111)	0.238 (0.152)	-0.058 (0.057)	-0.090 (0.056)	-0.122 (0.080)	-0.061 (0.097)	0.011 (0.053)
dist to green	-0.853 (0.538)	0.539 (0.527)	-0.015 (0.248)	0.072 (0.246)	-0.199 (0.374)	-0.230 (0.435)	-0.061 (0.257)
no. sport	0.132* (0.061)	0.242*** (0.081)	0.174*** (0.061)	0.116** (0.051)	0.053 (0.031)	0.257*** (0.081)	0.130*** (0.051)

	(0.074)	(0.085)	(0.047)	(0.048)	(0.071)	(0.059)	(0.046)
bus dens	0.081 (0.051)	0.111 (0.135)	-0.008 (0.028)	0.099*** (0.035)	0.054 (0.049)	0.049 (0.064)	0.344*** (0.052)
light rail dens	0.611 (0.512)	2.481*** (0.907)	1.132*** (0.254)	1.833*** (0.348)	1.239*** (0.478)	1.781*** (0.567)	1.842*** (0.309)
underground dens	-0.396 (0.322)	1.041** (0.500)	-0.573** (0.230)	0.361 (0.287)	0.211 (0.375)	0.684* (0.395)	1.271*** (0.116)
tram dens	0.036 (0.079)	0.102 (0.165)	-0.146*** (0.043)	0.008 (0.050)	-0.001 (0.084)	0.056 (0.090)	0.179*** (0.044)
U/tram noise	0.008 (0.005)	0.011** (0.005)	0.010*** (0.003)	0.004 (0.003)	0.009** (0.004)	0.008 (0.005)	0.008*** (0.003)
train noise	-0.057*** (0.014)	-0.079*** (0.015)	-0.032*** (0.008)	-0.037*** (0.007)	-0.027*** (0.009)	-0.053*** (0.013)	-0.040*** (0.007)
street noise	-0.024** (0.037)	-0.001 (0.010)	-0.045*** (0.007)	-0.021*** (0.007)	-0.019** (0.009)	-0.015 (0.011)	-0.026*** (0.006)
x-coord	-0.016 (0.037)	0.069 (0.056)	-0.073*** (0.025)	-0.037** (0.016)	0.005 (0.020)	0.035 (0.029)	0.015 (0.018)
y-coord	0.014 (0.030)	0.026 (0.050)	-0.007 (0.024)	0.057*** (0.016)	0.046*** (0.018)	0.008 (0.021)	0.050*** (0.015)
const	-3.580 (5.180)	-6.355*** (1.704)	-1.385 (1.065)	-2.594*** (0.769)	-2.504** (1.019)	-2.661** (1.101)	-0.870 (0.744)
Controls	Y	Y	Y	Y	Y	Y	Y

FE	Y	Y	Y	Y	Y	Y	Y
IV	Y	Y	Y	Y	Y	Y	Y
N	15850	15850	15850	15850	15850	15850	15850
OVERID	0.029	0.066	4.828	0.529	1.904	1.768	0.170
OVERIDP	0.866	0.797	0.028	0.467	0.168	0.184	0.680

Standard errors in parentheses

Instruments: dist_Wall, dens_squat

* p<0.1, ** p<0.05, *** p<0.01

Table 5: First stage regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	agency	finance	architect	consultant	engineer	insurance	law firm
	log cult dens	log cult dens	log cult dens	log cult dens	log cult dens	log cult dens	log cult dens
dist to wall	-0.035*** (0.002)	-0.030*** (0.002)	-0.029*** (0.002)	-0.028*** (0.002)	-0.036*** (0.002)	-0.035*** (0.002)	-0.028*** (0.002)
squat density	0.071*** (0.006)	0.090*** (0.006)	0.077*** (0.006)	0.071*** (0.006)	0.078*** (0.006)	0.065*** (0.006)	0.089*** (0.006)
employment	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000* (0.000)	-0.000** (0.000)	-0.000 (0.000)
rent	0.010*** (0.003)	0.002 (0.003)	0.002 (0.003)	0.020*** (0.003)	0.001 (0.003)	0.012*** (0.003)	0.021*** (0.003)
migrants	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
dist research	-0.056*** (0.004)	-0.051*** (0.004)	-0.057*** (0.004)	-0.053*** (0.004)	-0.055*** (0.004)	-0.056*** (0.004)	-0.067*** (0.004)
dist university	0.016*** (0.004)	0.010*** (0.004)	0.012*** (0.004)	0.020*** (0.004)	0.017*** (0.004)	0.021*** (0.004)	0.002 (0.004)
dist VC	-0.057*** (0.003)	-0.058*** (0.003)	-0.083*** (0.003)	-0.059*** (0.003)	-0.073*** (0.003)	-0.060*** (0.003)	-0.054*** (0.003)
dist to water	-0.081*** (0.005)	-0.061*** (0.005)	-0.067*** (0.005)	-0.084*** (0.005)	-0.078*** (0.005)	-0.079*** (0.005)	-0.071*** (0.005)
dist to green	-0.233*** (0.019)	-0.211*** (0.018)	-0.309*** (0.019)	-0.291*** (0.019)	-0.249*** (0.018)	-0.230*** (0.019)	-0.174*** (0.020)
sport	0.020** (0.010)	0.016* (0.009)	0.009 (0.009)	0.015* (0.009)	0.012 (0.009)	0.017* (0.010)	0.014 (0.009)
bus dens	0.107*** (0.002)	0.106*** (0.002)	0.094*** (0.002)	0.104*** (0.002)	0.094*** (0.002)	0.105*** (0.002)	0.105*** (0.003)
light rail dens	1.285*** (0.039)	1.234*** (0.039)	1.050*** (0.038)	1.302*** (0.038)	1.102*** (0.037)	1.326*** (0.038)	1.156*** (0.039)
underground dens	1.162*** (0.017)	1.136*** (0.018)	1.138*** (0.017)	1.248*** (0.018)	1.124*** (0.017)	1.174*** (0.017)	1.155*** (0.018)

tram dens	0.219*** (0.005)	0.214*** (0.005)	0.200*** (0.005)	0.211*** (0.005)	0.197*** (0.005)	0.210*** (0.005)	0.200*** (0.005)
U/tram noise	0.001** (0.000)	0.000 (0.000)	0.000 (0.000)	0.001 (0.000)	0.000 (0.000)	0.001** (0.000)	0.001 (0.000)
train noise	-0.000 (0.001)	0.001 (0.001)	-0.000 (0.001)	-0.001* (0.001)	0.001* (0.001)	-0.001* (0.001)	0.001** (0.001)
street noise	-0.001 (0.001)	-0.002** (0.001)	-0.002*** (0.001)	-0.001 (0.001)	-0.002*** (0.001)	-0.001 (0.001)	-0.002*** (0.001)
x-coord	-0.013*** (0.001)	-0.009*** (0.001)	-0.008*** (0.001)	-0.009*** (0.001)	-0.007*** (0.001)	-0.012*** (0.001)	-0.012*** (0.001)
y-coord	-0.021*** (0.001)	-0.019*** (0.001)	-0.017*** (0.001)	-0.019*** (0.001)	-0.017*** (0.001)	-0.020*** (0.001)	-0.016*** (0.001)
const	1.580*** (0.071)	1.477*** (0.070)	1.827*** (0.071)	1.391*** (0.073)	1.704*** (0.071)	1.549*** (0.071)	1.463*** (0.074)
FE	Y	Y	Y	Y	Y	Y	Y
F	1506.019	538.533	733.520	755.817	915.682	1359.806	577.927
r2	0.842	0.861	0.873	0.861	0.863	0.844	0.871
N	15850	15850	15850	15850	15850	15850	15850

Standard errors in parentheses

* p<0.1, ** p<0.05, *** p<0.01