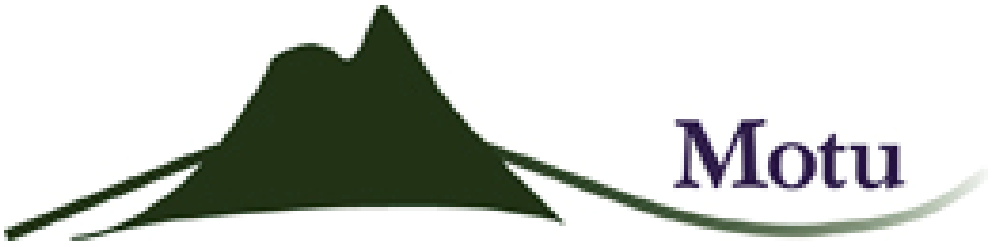

Patterns of business location in Auckland

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Motu Working Paper 11-08
Motu Economic and Public Policy Research

May 2011

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Acknowledgements and Disclaimer
We are particularly grateful to Richard Fabling for very valuable discussion and comments that have greatly improved the paper. Thanks also to Arthur Grimes for helpful discussions, and to three anonymous referees for useful suggestions. Thanks also to Mairéad de Roiste and Andrew Rae of Victoria University for assistance with GIS manipulation, and to EeMun Chen, from the Auckland Policy Office (MED), for her support.
Access to the data used in this study was provided by Statistics New Zealand in accordance with security and confidentiality provisions of the Statistics Act 1975. Only people authorised by the Act are allowed to see data about a particular business or organisation. The results of this work have been confidentialised to protect individual businesses from identification. The opinions, findings, recommendations and conclusions expressed in this report are those of the authors. Statistics New Zealand and Motu take no responsibility for any omissions or errors in the information contained here. The results are based in part on tax data supplied by Inland Revenue to Statistics New Zealand under the Tax Administration Act 1994. This tax data must be used only for statistical purposes, and no individual information is published or disclosed in any other form, or provided back to Inland Revenue for administrative or regulatory purposes. Any person who had access to the unit-record data has certified that they have been shown, have read and have understood section 81 of the Tax Administration Act 1994, which relates to privacy and confidentiality. Any discussion of data limitations or weaknesses is not related to the data's ability to support Inland Revenue's core operational requirements.
The opinions, findings, recommendations and conclusions expressed in this report are those of the authors. Statistics New Zealand, the Ministry of Economic Development, the Ministry of Transport, the Ministry for the Environment, the Department of Labour, Motu and the University of Waikato take no responsibility for any omissions or errors in the information contained here. The paper is presented not as policy, but with a view to inform and stimulate wider debate. This paper has been prepared with funding from the Ministry of Science and Innovation's Cross Departmental Research Pool fund, secured and administered by the Ministry of Economic Development, New Zealand Government – Auckland Policy Office.

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Abstract

We investigate the spatial determinants of industrial location and productivity variation within the Auckland Urban Area. For over 300 local areas, we consider the influence on location choice and productivity of proximity to selected infrastructure, local services, and consumption amenities, and of the density and industry composition of local employment. Using data from a microdata panel of firms, we use count-data methods to model the location choices of new firms, and production function estimation for productivity estimation. We identify distinct location patterns across industries but, overall, the accessibility and employment composition measures that we examine do not account for industrial location and productivity patterns within Auckland. This increases the challenges of anticipating and planning for future business location patterns.

JEL codes

R3 - Housing Markets, Production Analysis, and Firm Location; R12 - Size and Spatial Distributions of Regional Economic Activity

Keywords

Urban economics; industrial location; count data models; productivity; agglomeration

Contents

1 Introduction 1

2 Business location decisions 2
- 2.1 Empirical studies 6
- 2.2 Location and productivity studies 8

3 Empirical specification 10
- 3.1 Identification issues 15

4 Data 17
- 4.1 Statistics New Zealand's *prototype* Longitudinal Business Database 17
  - 4.1.1 Industry composition and input - output links 17
  - 4.1.2 Production function variables 19
  - 4.1.3 New entrants 20
- 4.2 Amenity data 22
- 4.3 QVNZ land value 23
- 4.4 Population composition 24

5 Business location patterns in Auckland 25
- 5.1 Summary of patterns 25
- 5.2 Regression estimates of location choice and productivity 29

6 Summary and discussion 33

References 36

Appendix A : Industry classifications and input-output links 53

Appendix B : Principal component analysis of amenity measures 54

Appendix C : Full set of regression estimates 56

Tables

Table 1: Plants in the Auckland Urban Area – size and area composition 42

Table 2: Enterprises operating in the Auckland Urban Area – production sample 43

Table 3: Number of entering and exiting plants 44

Table 4: Number of entering and exiting plants – by industry 45

Table 5: Plants in the Auckland Urban Area – access to amenities 46

Table 6: Plants in the Auckland Urban Area – land prices and local population composition 47

Table 7: Industry concentration profiles (2007/08 year) 48

Table 8: Summary of regression estimates 49

Figures

Figure 1: Industry distribution across Auckland Urban Area 50

1 Introduction

Choosing a location is an important decision for a firm. A favourable location can increase a firm's productivity through improved access to local productive amenities such as infrastructure, and to the suppliers and customers with whom the firm interacts. In urban areas, firms may also benefit from access to thick labour markets, better matching, and knowledge spillovers (Rosenthal and Strange, 2004). Firms must weigh up the advantages of potential locations against the higher land prices that the location is likely to command.

The choice of location is a complex one. This paper endeavours to identify key determinants of location choices for firms entering the Auckland Urban Area. It does this by estimating the relationship between selected characteristics of each area, and the likelihood of the area being chosen by incoming firms. The relationship is estimated separately for each of 24 industry groups, to allow for distinct determinants of location decisions. The characteristics include measures of transport infrastructure, local services, and consumption amenities, as well as the density and industrial composition of employment around potential locations. We analyse the location choices of new firms as the location of existing firms may reflect historical as well as current attractiveness, since locations may have been chosen some time ago and it is costly to relocate. We also estimate the possible productivity advantages associated with the selected area characteristics, by estimating production functions for all firms within each industry.

A better understanding of the determinants of industrial location choices is valuable not only for researchers seeking to understand the evolution of urban land markets, urban form, and agglomeration. It is also important for those responsible for governing cities and shaping their futures. They need to anticipate the spatial pattern of changing demand for industrial and commercial land, in order to manage the availability of supporting infrastructure and facilities. In Auckland, understanding of industrial location is explicitly noted as one of the elements of a 20–30 year strategic spatial plan for the city. By legislation, the Auckland Council must prepare and adopt a spatial plan for Auckland that must, *inter alia*, "identify the existing and future location and mix of residential, business, rural production, and industrial activities within specific geographic areas within Auckland" (Local Government (Auckland Council) Amendment Act 2010 No 36: §79 (4)c).

The next section of this paper provides a broad overview of theoretical and empirical literatures on industrial location. This is followed in section 3 with an outline of our

empirical approach to estimating the key determinants of location choice. After describing, in section 4, the data that we use, we summarise industry location patterns within Auckland and report our regression estimates in section 5. Section 6 concludes with a summary and discussion of main findings.

2 Business location decisions

A firm's choice of location is a complex decision. Hayter (1997)[1] identifies three broad sets of factors that are weighed up, each of which is highlighted by a different strand of the theoretical literature: neoclassical, institutional, and behavioural. A fourth strand has received renewed interest recently, that of evolutionary theory.[2]

Neoclassical approaches

Neoclassical location theory focuses on location-related factors that affect profit maximisation or cost minimisation. Weber's (1909) seminal study examined location choices that minimise transport costs to both input and output markets. A firm chooses a location that is between its input and output markets. It locates close to inputs if they are costly to transport or they account for a high share of costs, or close to output markets if finished goods are costly to transport. In Weber's model, there is a unique optimal location. Moses (1958) showed that if firms' inputs are substitutable in production and firms choose their input mix in response to (transport-cost-related) input prices, there is a set of locations between which the firm is indifferent, reflecting different input mixes. The main insight of the Weber model and its many subsequent extensions is that proximity to input and output markets are key factors in firms' location choices, because of transport costs (or more generally, logistics costs (McCann, 1998)). Where firms differ in the outputs that they produce and the inputs that they use, observed location patterns will reflect complicated interactions between the choices of different firms.

Observed choices reflect the outcome of competition for land and for customers. Von Thünen's (1826) theory of land use focuses on the role of land rents in determining where firms locate. He examines the case where heterogeneous agricultural producers compete for locations around a central output market. Producers that face a high annual cost of transporting goods to market, due to a combination of frequency of access and high unit cost of transport, will locate centrally and pay a high land rent that reflects the savings that

[1] Cited in Pellenbarg (2002).
[2] See also McCann (2009) for a recent review of the theoretical literature.

they make from being close to the market. Producers with lower transport costs locate further from the centre and pay lower rents. Subsequent "monocentric" models of urban location (Alonso, 1964; Muth, 1969; Mills, 1967) apply and extend the basic insights of von Thünen's analysis, with rent gradients playing a crucial role.

Firms' choices of location also define the size of market that they serve. The resulting location patterns are best analysed in models in which firms choose locations from which to supply goods and services to a local catchment of customers who are evenly spread.[3] This is the approach taken by Palander (1935)[4] to define the market areas over which firms exert some degree of local monopoly power. Hotelling (1929) shows that competition between firms providing differentiated goods or competing other than on price will lead to firms locating together. "Central Place" theory demonstrates that clustering of economic activity can serve as an efficient arrangement for providing heterogeneous goods with different-sized spatial market areas (Christaller, 1933), or as the configuration of heterogeneous firms that minimises the transport costs of servicing a geographic area (Lösch, 1944).

The spatial clustering of economic activity, referred to as "agglomeration", that is a feature of all of these models depends on the assumption, often implicit, of increasing returns to scale, either at the level of the firm or for a geographic region. This assumption is needed to support the existence in the models of a single marketplace or of firms that operate at a finite number of discrete locations.

The major contribution of "new economic geography" models such as those in Fujita et al. (1999) is to provide a tractable approach to modelling the operation of geographical markets in the presence of increasing returns and transport costs. This supports the analysis of the *implications* of increasing returns, in particular the agglomeration of economic activity within and between countries. The new economic geography models are not, however, designed to distinguish possible *causes* of agglomeration.

The models do capture the pattern of cumulative causation analysed by Harris (1955), who used the idea of "market potential" to show that "[f]irms chose to produce in regions with good access to markets; but access to markets tended to be good in regions in which many firms chose to produce." (Krugman, 1998). One implication of the self-

[3] This is in contrast to the Weber, Moses, von Thünen and monocentric city theories, which have demand arising at a single spatial point.
[4] Cited in McCann (2001), pp. 27ff.

reinforcing development of geographic concentration is that small initial differences or changes can lead to divergent growth paths. Historical factors, as well as expectations, can play a decisive role in accounting for current patterns of geographic concentration (Krugman, 1991a, Krugman, 1991b).

A full understanding of the location choices of different firms requires an understanding of the nature and sources of increasing returns, which are likely to vary across firm types, and can take many forms (Duranton and Puga, 2004). In the most general terms, the benefits of agglomeration "all ultimately come from transport cost savings … interpreted broadly … [to] include the difficulties in exchanging goods, people, and ideas." (Glaeser, 2010, p. 1). The basic insights from neoclassical theory, which focuses on the costs of transporting goods, can be readily adapted and applied to activities that do not involve the transport of physical goods, but for which other costs of operation rise with geographic separation. McCann (2008) generalises the idea of transport costs under the heading of "spatial transactions costs". Under this heading, he includes not only the cost of sending goods and services across space, which have fallen over time, but also the costs associated with acquiring and transacting knowledge across space. He argues that these latter costs have risen over time due to the increased quantity of face-to-face interaction needed to effect non-standardised transactions, on average outweighing the dispersing effect of declining transmission costs, and leading to greater concentration of economic activity. The relative importance of declining transmission costs and rising costs of transacting across space will, however, vary across economic activities. McCann's analysis thus implies increased concentration of knowledge-intensive activities at the same time as dispersion of activities that primarily involve the transport of goods, services and standardised information. McCann and Sheppard (2003) emphasise the importance of incorporating such variation in the future development of theories of industrial location.

Much of the literature has highlighted the operation of agglomeration effects in models of relatively homogeneous firms. This is justifiable given the gains in tractability. However, it has diverted attention from the complexity of underlying patterns and processes. The longstanding distinction (Hoover, 1936) between localisation, whereby firms co-locate with firms in the same industry, and urbanisation, whereby firms are attracted to large, dense and industrially diverse areas, highlights the need to look at least at cross-industry variation, and at the links between industries. There have recently been calls to focus future research

efforts on understanding how the interaction of heterogeneous firms and people "affect the existence and the intensity of agglomeration economies" (Ottaviano, 2010).

In summary, the neoclassical approach to modelling firm location choices highlights a range of factors that influence firm location: proximity to suppliers and customers; transport costs; competition in land markets; competition for market areas; and the operation of economies of scale at the level of the firm or local area. It is this set of broad influences that we focus on in our empirical work.

Behavioural approaches

Behavioural approaches to firm location recognise that while neoclassical theories might pinpoint important factors in location decisions, the realities of location choice are generally less clearly delineated. McCann (2001, pp. 35ff) identifies two main themes in behavioural theories of location choice. First, firms need to make their choices without full information about all possible options. They may make rational choices on the information at hand but rationality is "bounded" (Simon, 1957) due to the limited information or the costs and difficulty of obtaining and processing additional information. They instead rely on rules of thumb or indicators to guide their decisions. Second, location choices may reflect the pursuit of objectives other than profit maximisation or cost-minimisation, which are the cornerstones of neoclassical theory. Actual choices may reflect goals such as the desire to maximise revenue, or may be made to ensure an adequate rather than maximal profit ("satisficing"). Behavioural theories focus primarily on understanding the processes by which location decisions are made.

Institutional approaches

The third, institutional, strand of location theories identified by Hayter (1997) focuses on the influence of the institutional context in which firms operate. Firm location decisions are characterised as the outcome of interactions and negotiations between the firm and its suppliers, customers, employees, and various levels of government. These interactions take place within a legal, cultural, and policy environment, and are influenced by factors such as power relations and community and corporate values. The institutional approach maintains that "the form and evolution of the economic landscape cannot be fully understood without giving due attention to the various social institutions on which economic activity depends and through which it is shaped" (Martin, 2000).

Evolutionary approaches

The fourth strand of the literature, the evolutionary approach, aims to explain how firms' behavioural processes evolve over time through interactions with local institutions (Boschma and Lambooy, 1999; Bound and Frenken, 2006). The evolutionary approach generally uses case studies of particular locations or industries and builds an in-depth understanding of how and why spatial patterns have evolved over time. Observed patterns of firm location are seen as highly context specific and path-dependent. Consequently, the approach provides insights into the factors and processes that might be important, but does not support predictions of location patterns in contexts other than the specific ones studied.

Our aim in the current study is to identify the determinants of broad patterns of firm location across Auckland rather than to explain the specifics of particular industries or firms. We therefore rely primarily on the neoclassical approach, and focus on the strength of broad influences such as land prices, accessibility to selected locational amenities, localisation and the attraction of high density. We are interested in differences across industries in the strength of these influences but we do not aim to provide in-depth accounts of the evolution of particular industry distributions.

2.1 Empirical studies

Our purpose in this study is primarily empirical rather than theoretical: to identify the determinants of actual location patterns (even though Lösch suggests that this is the "less dignified" of the two endeavours).[5] Consistent with Ottaviano's call for greater attention to the influence of heterogeneous firms and workers, Strange (2009) advocates that empirical work should also follow this route – using increasingly available of disaggregated data. Our study responds to this challenge and uses detailed firm microdata to examine location choices.

In contrast, a large part of the industrial location literature has been at a fairly aggregated level, examining patterns of location choice between rather than within urban areas, often with limited industry disaggregation. Blair and Premus (1987) review the literature to the mid-1980s and identify two main empirical approaches: qualitative surveys and econometric studies. These two methods yield similar broad insights on the importance

[5] "The real duty of the economist is not to explain our sorry reality, but to improve it. The question of the best location is far more dignified than determination of the actual one" (Lösch, 1944, p.4)

of "traditional location factors" of access to markets, labour, transportation and raw materials, though the authors note the growing importance of other variables such as labour quality, taxes and infrastructure. In general, the findings echo the insights from earlier descriptive analyses (Marshall, 1920; Haig, 1926; Jacobs, 1969).

The primary focus of many studies was to explain the changing regional distribution of employment and population, and in particular the changing patterns of manufacturing employment. A secondary interest was accounting for the movement of manufacturing out of central cities into the suburbs which was observed in the US. Carlino et al. (2007), for instance, adapt the simultaneous equation approach of Steinnes and Fisher (1974) to jointly model employment and population growth rates across US counties in the 1970s. They report separate estimates for manufacturing employment, and capture suburbanisation with indicators for "central city" counties and counties adjacent to central cities. Subsequent studies have applied similar methods to more detailed locations within metropolitan areas (for example, Erickson and Wayslenko (1980)) or to more detailed employment subgroups (such as Deitz (1998) and Arauzo-Carod (2007), who disaggregate by occupation).

An alternative approach to analysing decentralisation was adopted by Baum-Snow (2007) and Duranton and Turner (2008), following the approach of Moses and Williamson (1967). They analyse how the presence of motorways into and out of central cities affected firm location choices and show that motorways accelerated the decentralisation of the city as it became increasingly attractive for firms to locate in suburbs where cheap land was available.

A major departure from this approach of analysing employment growth across locations was the work of Carlton (1983), who examines the location choices of 527 new plants in three selected manufacturing industries. He uses a discrete-choice model (McFadden, 1973) to capture firms' choices of metropolitan area. He also uses information on plant size to identify his model. He finds that energy costs in a metropolitan area have a strong influence. Firms are also drawn to areas where there is an existing concentration of plants in their industry, with this effect strongest for small entering plants.

Arauzo-Carod et al. (2009) review more recent empirical literature on industrial location, focusing on econometric studies that use microdata, as in Carlton's study. The authors distinguish studies such as Carlton's that use discrete-choice models from more

recent studies that use closely-related but more tractable count-data methods. Discrete-choice models that have been used in this literature include McFadden's (1973) conditional logit model and multinomial logit model. The former relates the choice of location to characteristics of locations, with effects possibly varying by firm type, whereas the latter relates choices to characteristics of the firms making the choices. DCM models become computationally burdensome where the number of choices or the number of firms is large. The alternative of count-data modelling overcomes this difficulty by modelling the number of firms choosing each location. The current paper uses count-data methods, which are described in more detail below.[6]

The studies reviewed by Arauzo-Carod (2009) deal with various types of firm location choices, including the location of new plants, and in particular foreign plants, as well as the distribution of existing plants. The findings of the studies identify a range of local characteristics that are influential in firms' choices of location. In particular, they find support for the importance of local unemployment, education, transport infrastructure, and agglomeration effects – the existing density of economic activity and of own-industry activity in an area.

2.2 Location and productivity studies

In a spatial equilibrium, the willingness of firms in dense urban areas to pay higher nominal wages and higher land rents requires that there are productivity advantages from locating there. If there were not, firms could make higher profits by locating elsewhere. There is an extensive literature that measures differences in firm performance across locations, and seeks to identify the nature and extent of the productivity benefits. Rosenthal and Strange (2004) review the empirical literature and identify five main empirical approaches that have been used to identify agglomeration effects: direct estimation of productivity effects using production functions, estimation of the relationship between agglomeration and growth, analysis of the location choices of new firms (as described above), analysis of wage differences across locations, and analysis of rent differences across locations.

In New Zealand, the strength of agglomeration effects on labour productivity has been examined in several recent studies. Maré and Timmins (2006) examine regional differences in labour productivity. They find that labour productivity is higher in larger regions and for more localised industries. Manufacturing and wholesaling industries benefit

[6] See Wu (1999), Becker and Henderson (2000) and Guimarães et al. (2003) for examples of count-data modelling firm location models.

from both localisation and urbanisation, although there is limited evidence of agglomeration effects for service industries. The benefits of industry diversity are evident mainly for young firms.

Two studies have focused specifically on agglomeration patterns in Auckland: Maré (2008) examines labour productivity, and Williamson et al. (2008a, 2008b) examine earnings premiums. Productivity and earnings are both higher in denser areas of Auckland. Maré (2008) reports that about half of Auckland's labour productivity premium over the rest of New Zealand is due to industry composition. Within Auckland, he finds that labour productivity is highest for industries that are over-represented in Auckland and concentrated within Auckland. There is, however, a sizeable Auckland premium for all industries.

The only study that estimates agglomeration effects using firm-level production functions is that of Maré and Graham (2009). They examine the relationship between multi-factor productivity and employment density ("agglomeration elasticities") for the whole of New Zealand, with separate estimates by industry and region. Their study confirms the positive association between density and productivity that was evident in the labour productivity and income studies, although the magnitude of the effect is smaller than for labour productivity. The benefits of density are greatest for highly urbanised industries (property and business services; finance and insurance). Across regions, agglomeration elasticities are higher in less dense areas, and somewhat lower in Auckland than in other regions.

In the current paper, we complement our estimation of location choice determinants with direct production function estimation. Cohen and Morrison Paul (2009) review recent international studies of agglomeration that estimate production or cost functions. Such studies include proxies that are intended to capture different sources of agglomeration economies. The proxies, though generally plausible, are often fairly broad measures, limiting the ability of studies to distinguish between alternative explanations. Proxies such as total employment in or surrounding a city, the density of employment, or the diversity of an area's industrial structure are used as proxies for urbanisation effects. Industrial composition measures are also used to capture localisation economies (own-industry share of employment), and forward and backward links (share of input industries and output industries). Measures of local workforce composition are used to capture the potential for labour market spillovers.

Overall, the literature finds evidence for a broad range of different agglomeration mechanisms. The estimated strength of effects and the relative strength of the different mechanisms do, however, vary across studies. It is likely that these differences in turn reflect a range of factors: the proxies chosen, the industries studied, the data and methods used, and the geographic context.

Despite the lack of definitive, generalisable findings, production function studies of agglomeration are a useful first step in identifying the anatomy of agglomeration economies. In particular, they are able to demonstrate the variation of agglomeration effects across industries, geographic distance, and time (Rosenthal and Strange, 2004), and identify important spatial correlates of productivity.

3 Empirical specification

We use firm microdata to estimate the relationship between the location choices of firms entering the Auckland Urban Area and the characteristics of those areas. We characterise a firm's location choice as one of profit maximisation. It chooses the location that yields the greatest profit. Clearly in the light of the discussion in the previous section, this characterisation abstracts from many important behavioural and institutional factors that influence location decisions, but nonetheless provides a tractable and potentially useful basis for estimating the influence of key location choice factors.

Assume that the firm produces an output y by combining factor inputs (capital, land, labour, materials) denoted M. The firm's output is augmented by various features of the local area, including agglomeration factors that have been identified in previous empirical studies of firm location. These local productive inputs ("amenities") are denoted as A. The production function for firm i operating in location x is written as:[7]

$$\ln y_{ix} = \beta_i + \beta_M \ln M_{ix} + \beta_A \ln A_x \qquad (1)$$

Under the assumption that the firm chooses its factor inputs optimally, the profit that the firm earns from operating in location x can be written as a function of the prices of the factors and amenities ("the profit function").[8]

$$\ln \pi_{ix} = \alpha_i + \alpha_M \ln w_x^M + \alpha_A \ln w_x^A \qquad (2)$$

[7] In this very simple formulation, area characteristics have a Hicks-neutral effect on productivity – not changing the relative productivities of other factors. More refined models are possible that relax this assumption, as in Graham and Kim (2007).
[8] See Varian (1984).

where w denotes the price. Note that the price of factor inputs (w_x^M) has an x subscript, indicating that prices may vary across locations.

The firm is assumed to choose the location that maximises its profit. Following the approach of McFadden (1973), as adopted by Carlton (1983), we allow for there to be random variation around the profit function (2), by adding an extra term (ε_{ix}) with an assumed statistical distribution.[9] Under this assumption, the probability that firm i chooses location x can be written as:

$$P[X = x] = \frac{\exp\left(\alpha_i + \alpha_M \ln w_x^M + \alpha_A \ln w_x^A\right)}{\sum_s \exp\left(\alpha_i + \alpha_M \ln w_s^M + \alpha_A \ln w_s^A\right)} = \frac{\exp\left(\alpha_M \ln w_x^M + \alpha_A \ln w_x^A\right)}{\sum_s \exp\left(\alpha_M \ln w_s^M + \alpha_A \ln w_s^A\right)} \quad (3)$$

where the summation in the denominator is over all possible locations. Firm-specific profit components (α_i) cancel out of the ratio. Note that if factor prices do not vary across locations, they too will drop out of the estimating equation.

While it is possible to estimate equation 3 using maximum likelihood methods, doing so becomes computationally burdensome where there are many possible locations or many firms. Guimarães et al. (2003) show that the parameters of the model can be estimated by modelling not the probability that the firm chooses location x, but a count of the number of firms choosing location x. For entering firms in industry group g, the number of firms choosing location x is shown to be independently distributed with the following expected value and variance:

$$\begin{aligned} E\left[n_{gx}\right] &= \lambda_{gx} = \varphi_x \exp\left(\delta_g + \alpha_{gM} \ln w_x^M + \alpha_{gA} \ln w_x^A\right) \\ Var\left[n_{gx}\right] &= \lambda_{gx} + \psi \lambda_{gx}^2 \end{aligned} \quad (4)$$

where δ_g, a_{gM}, a_{gA} and ψ are parameters to be estimated and φ_x is a variable controlling for the size of the area. The parameter ψ in the variance equation allows for the variance to be greater than the mean. This is a negative binomial model.[10] The parameters are group-specific, as indicated by the "g" subscript. The equations are thus estimated separately by industry group.

The negative binomial specification deals adequately with observations where the count is zero, though only if the choice reflects relative unattractiveness. In the context of

[9] The random term (ε_{ij}) is assumed to have a Type 1 Extreme value distribution, with cumulative distribution $F\left(\varepsilon_{ixt}\right) = \exp\left(-\exp\left(-\varepsilon_{ixt}\right)\right)$

[10] When $\psi = 0$, the negative binomial model is equivalent to the Poisson model (Cameron and Trivedi, 1998).

firm location choice, land use regulations such as zoning will exclude certain locations from firms' choice sets, leading to a zero count of entrants even for potentially attractive locations. The inability to distinguish unattractive from excluded locations could lead to biased parameter estimates. To test the sensitivity of estimates to such potential biases, we estimate the regression model on a restricted sample of locations. Specifically, for each industry, we exclude locations where no firm from the industry is ever observed operating. This overcorrects for the problem, in that it excludes some unattractive as well as excluded locations. In practice, estimates obtained from the full sample are very similar to those using the restricted sample, suggesting that biases arising from the existence of zoning are small. The estimates that we report are based on the restricted samples.

Variables included in the negative binomial location choice model

In our study, the set of areas from which firms choose a location are defined by statistical boundaries ("area units"). These vary in size and in the number of people and firms that they contain. The variable φ_x captures the size of different locations. We use the area's (log of) total employment in the previous year as a measure of size. Although the variable enters equation 4 with a coefficient of 1, we relax this constraint and allow φ_x to enter with a coefficient of γ.[11]

The vector $\ln w_x^A$ contains measures of the location-specific prices of accessing amenities. We include two sets of amenity-related measures. The first set captures the proximity of areas to each of seven spatial features, four reflecting accessibility to transport (motorway ramp, railway station, airport, port) and three capturing access to local retail services (supermarkets and banks) and central city amenities (proximity to CBD). The higher the proximity measure, the lower is the price of accessing the amenity. The measures are all captured as the log of straight-line distance to the feature, multiplied by -1 (to convert it to a proximity rather than distance measure).

The second set contains measures of agglomeration-related factors as identified in the firm location literature. Broad agglomeration effects are captured by employment density in a circle of 5 km radius around each area, as measured in the previous year. Specifically, density is entered as two variables – ln(Employment) and -1*ln(land area).[12] If it is density

[11] Specifically, φ_x is replaced by $(\ln Emp_x)^\gamma$.

[12] The log of employment for the area itself is already included as φ_x. The density of the area itself is controlled for by separately including -1*ln(area) for the area. The land area for the 5 km circle can vary because it is calculated based on whether the centroids of other areas lie within 5km of the area's own centroid.

rather than employment size that matters, the coefficients on these two variables will be equal. The coefficient on the land area variable can be interpreted as the effect of density independent of the effect of employment size *per se*. A firm's attraction to areas where its own industry is prevalent ("localisation") is captured by including the proportion of local employment (within 5 km) accounted for by the other firms in the same industry. Similarly, forward and backward linkages (links to customers and suppliers) are captured by local industry composition. Based on industry input-output tables, we identify the industries that account for a high proportion of inputs to (or outputs from) the firm's industry, and calculate the share of local employment accounted for by these industries. We also include a measure of the diversity of industry structure within a 5 km radius, measured as an industry Herfindahl,[13] and an indicator variable for whether the area is part of the CBD, to test for any additional attractiveness not captured by the other included measures. Finally, we include local workforce characteristics to capture the potential advantages of access to household customers, and the benefits of thick labour markets and proximity to a skilled or diverse local workforce. We include a measure of (the log of) population density within 5 km of each area unit, as well as composition measures that capture the percentage of the local population accounted for by degree-holders, migrants and new arrivals.

The vector $\ln w_x^M$ contains measures of the prices of location-specific inputs. The only price variable that we observe reliably at the area level is the price of land, which is included in log form. To the extent that other factor prices, such as the cost of capital or energy prices, are uniform across Auckland, they would be dropped from equation 4 anyway. In the absence of location-specific price measures, their influence will be picked up by other included measures with which they are correlated. If input prices are low because of lower transport costs, the attraction of low-cost areas will be reflected in the coefficients on the transport-related accessibility measures.

A final factor that we control for in the regressions is the strength of firm turnover in each area. The likelihood of a new firm moving into an area will be influenced by the availability of suitable vacant premises. We therefore control for the overall number of firm exits in each area, as well as the number of exits by firms of the same industry, including both

[13] The measure is $H_z = \sum_j \left(\left(\frac{E_{jz}}{E_{\bullet z}} \right)^2 \right)$, where E_{jz} is employment of industry j in a 5 km radius circle around each location (z).

as logged measures. The same-industry measure is included to allow for the possibility that different industries require distinctive types of premises.

Variables included in the augmented production function model

We report not only the estimates of the location choice equation 4, but also direct estimates of industry production functions, as shown in equation 1. The sample for these estimates includes not only the new entrant firms but all firms operating in each area. The production function estimates show the contribution of the firm's inputs of labour, capital services, and intermediate consumption ($\ln M_i$) to gross output (y_i). We observe these measures at the level of the enterprise rather than at plant level. We therefore include in the regressions a measure of the proportion of the firm's employment that is in non-Auckland Urban Area plants, to allow for productivity differences between Auckland and the rest of New Zealand. Enterprises operating only in Auckland may be different from those operating in multiple areas, so we also include an indicator variable for "Auckland-only" enterprises.

In addition, we include variables to capture the inputs of local productive inputs and agglomeration effects. For this, we use the same set of measures as used in the location choice regressions. In the location choice regressions, we used them as proxies for the location-specific prices of access. In the production functions, we include them as proxies for the quantity of local inputs used by the firm.[14] As a result, the coefficients on the amenities ($\ln A_x$) in the two equations are not functionally related as they are in Carlton's (1983) formulation. In the production function, their coefficients reflect a combination of price and quantity effects.

We do not include the number of firm exits as a covariate in the production estimation, since productivity is less likely to be related to turnover than is entry.

[14] Under profit maximisation, there is an inverse relationship between prices and optimal quantities of inputs.

3.1 Identification Issues

Location choice equation

There are three main potential identification problems with the estimation of the location choice equation 4: omitted amenities; unobserved supply prices; and simultaneity. The first econometric problem is the omission of spatial amenities. Our limited list of spatial amenities will not have captured all relevant features of each location. To the extent that omitted amenities are correlated with included covariates, they will bias the coefficients on those covariates. One likely problem is that the price of land is correlated with the omitted amenities, as firms pay a premium to be in a location convenient to these amenities. To reduce this problem, we include a *spatial* lag of land prices in the regression on the assumption that the value of omitted amenities is capitalised into land prices. To the extent that omitted amenities are spatially correlated, the inclusion of neighbourhood land price will reduce the omitted variable bias. The omission of area-level characteristics may also induce correlation among the regression residuals (Moulton, 1990). We therefore calculate the standard errors in the location choice regressions using robust errors, clustered by area unit.

Secondly, the model is derived on the assumption that the firm treats land prices as exogenous, being deterred by high land prices that reflect the cost of supply. The observed measures of land price, however, reflect both demand and supply influences. A firm may be attracted to high priced areas if the high price reflects high local demand for land. We control for this (imperfectly) by using land prices from the previous year as an instrument, on the basis that demand fluctuations are likely to be more volatile than supply fluctuations. Persistent demand fluctuations will limit the effectiveness of this control. In practice, we use a control function approach to implement this solution. We regress current land price on the lagged land price and all other exogenous covariates in equation 4, and then include the *residual* from this regression as an additional regressor in equation 4. For a nonlinear (negative binomial) model, this is preferable to the more familiar approach of replacing the endogenous variable with its *prediction* from the first stage regression.[15]

The third identification problem (simultaneity) is that the measures of agglomeration may be a consequence rather than a cause of inflows of new firms. A high inflow of firms into an area will contribute directly to the total employment of the area. For this reason, we use lagged employment as an instrument for current employment, using a

[15] For a discussion of the consistency of control function approaches for non-linear models, see Blundell and Powell (2003), Blundell and Smith (1989), Terza (1998), and Wooldridge (2002).

control function approach as outlined above. A high inflow will affect not only the total employment in an area, but also the composition and diversity of employment, as captured by the amenity variables. To address this issue, we use lagged values of all composition, diversity, and neighbourhood density measures. Land prices, too, may respond to the arrival of new entrants. However, using lagged prices to instrument for current prices, as outlined above, deals adequately with this problem.

Production function equation

Identification issues may also arise in the estimation of the production function as a consequence of the interaction of firm heterogeneity and endogenous factor choice. We estimate equation 1 using firm-level panel data. The term β_t is a firm-specific component of productivity. We first estimate the production function treating this as a common constant across all firms, and allowing for a random error term in the estimating equation. Firms with persistently or permanently high productivity (a high value of β_t) will have high outputs, and will choose their factor inputs in response to their idiosyncratic productivity effect. This may lead to biased production function estimates as outputs and inputs are codetermined and therefore correlated. We therefore estimate a firm-fixed-effect model, which is identified from variation across time within each firm, and removes the influence of firm heterogeneity. This approach is equivalent to including a separate β_t constant for each firm. One disadvantage of using this "fixed effect" specification is that it is not possible to identify the influence of time-invariant factors. Since most firms remain in a single location, accessibility measures such as proximity to a motorway ramp cannot be identified reliably.[16]

As in the location choice regressions, we estimate robust, clustered errors. For production function regressions that include only firm-level variables, we allow for clustering by enterprise. Where area-level variables are included, we allow for clustering by area unit. Where firms operate in more than one area unit, we assign them to their own cluster.[17]

[16] Fixed effects coefficients can be estimated for such variables. The variation comes from firms that operate in multiple locations. The accessibility measures are calculated as an employment-weighted average over all of the firm's plants, so there is variation over time as a result of the firm changing its spatial distribution of employment.

[17] We do not adjust for biases that may arise from firms adjusting their factor inputs in response to innovations in their idiosyncratic productivity. Firms may increase variable inputs in response to a favourable productivity shock, generating reverse causality between output and factor inputs, and an upward bias in the coefficient on variable inputs. Checking the robustness of results to this potential bias is a potential extension to our study, using structural identification as in Olley and Pakes (1996), Levinsohn and Petrin (2003), or Ackerberg et al. (2006).

4 Data

This study uses spatially referenced data on the location of firms in the Auckland Urban Area, and on the location of various local amenities. These data are used to examine the location choices of firms entering the Auckland Region. It also uses production data to support the analysis of the influence on firm productivity of local amenities and local employment composition. The analysis draws on three main sources. First, Statistics New Zealand's Longitudinal Business Database (LBD) provides information on firm location and also on firm production. Second, land price information is obtained from valuation summaries provided by Quotable Value New Zealand. Third, information on the location of amenities is assembled from Geographic Information System (GIS) files obtained from a variety of sources.

4.1 Statistics New Zealand's *prototype* Longitudinal Business Database (LBD)

The LBD is based around the Longitudinal Business Frame (LBF), which provides longitudinal information on all businesses in the Statistics New Zealand Business Frame since 1999, combined with information from the tax administration system. The LBF population includes all employing businesses. We make use of the permanent enterprise identifiers developed by Fabling (2011), which uses plant transfers to improve the tracking of firms over time.

Information is available annually, aligned to March tax years. The first full year of data that we use is for the year to March 2000, denoted 1999/2000, and the latest is for 2007/08. For presentational convenience, years are sometimes referred to by the endpoint (eg: 1999/2000 is referred to as the 2000 year). Financial data are often available only for firms' financial years and are assigned to the closest tax year.

The primary unit of observation in the LBD is an enterprise (firm) year. We use business demographic information from the LBF, linked with financial performance measures for the 1999/2000 to 2007/08 years. Information from the Linked Employer-Employee Dataset (LEED) on plant location and employment is used to identify the area units in which each plant operates.

4.1.1 Industry composition and input-output links

Employment density and the industrial composition of local employment (localisation, input-output links, and diversity) are all derived from the LBD data. They are measured for an area within 5 km of each area unit, as captured by straight-line distance from

the geographic centroid of the area unit. We include in the local measures any other area units with centroids lying within a 5 km radius.

In order to identify whether firms are attracted to areas by the presence of input-supplying or output-using industries, we use inter-industry transactions data as tabulated in the Inter-Industry Study 1996 (Statistics New Zealand, 2001). We identify the minimal set of industries that nationally account for at least 50 percent of each industry's inputs, or at least 50 percent of outputs. The calculations are done based on a 49-industry classification, as listed in Appendix A. The Appendix also shows how these industries are grouped to give the 26-industry categorisation that we use.

Table 1 summarises information on plants operating in the Auckland Urban Area, and the composition of local employment. The count of the number of plants and the measure of employment in each industry are based on data from 2008. Other measures are averages across the entire study period. In 2008, there were over 110,000 employing plants operating in the Auckland Urban Area. Total employment was around 770,000. The data include some relatively small industries – with fewer than 300 plants or employment of less than 4,000. Two of these, non-metallic manufacturing (C26) and the combined[18] "mining and quarrying" and "electricity, gas and water" (BD), each with employment of less than 4,000, are omitted from some of the subsequent analyses due to their size.

The variation of own-industry employment shares largely reflects the relative sizes of industries. However, most of our subsequent analyses are carried out separately by industry, so that it is the variation of own-employment shares *within* industries that is relevant for our analyses, for which standard deviations range from to 0.04 to 0.10. There is considerable variation both between and within industries in the proximity to input industries and to output industries, with overall mean values of 0.28 and 0.30 respectively, indicating that 28 (30) percent of the employment within a 5 km radius is in firms' input (output) industries.[19] There is a clear negative relationship between industry diversity and local employment density. Even though dense urban areas tend to be more diverse than less dense settlements, the intra-metropolitan pattern that we observe here is that denser areas within the Auckland Urban Area are generally less industrially diverse. Industries such as

[18] These two industry groups are combined to ensure that the analyses presented do not disclose information about particular enterprises.

[19] For some industries, such as retail and personal services, which sell goods and services directly to the household sector, customer access may be better captured by local population density, which is included separately in the regressions.

accommodation and restaurants, finance, and insurance and financial services, are all located in high employment density areas with relatively low industrial diversity – mainly in and around the CBD.

4.1.2 Production function variables

For production function estimation, we follow Fabling and Maré (forthcoming). Gross output is measured as the value of sales of goods and services, less the value of purchases of goods for resale, with an adjustment for changes in the value of stocks of finished goods and goods for resale. Gross output and factor inputs are measured in current prices.[20] The measure of capital services has four components: depreciation; rental and leasing costs; rates; and the user cost of capital. The inclusion of rental and leasing costs and rates ensures consistent treatment of owned and rented or leased capital. The user cost of capital is calculated as the value of total assets, multiplied by an interest rate equal to the average 90-day bill rate plus a constant risk-adjustment factor of four percentage points. Intermediate consumption is measured as the value of other inputs used in the production process, with an adjustment for changes in stocks of raw materials.

Data from the Annual Enterprise Survey (AES) is the benchmark for the measurement of gross output, intermediate consumption and capital services. AES-sourced measures are available for around ten percent of enterprises, which are disproportionately larger firms, accounting for around 50 percent of total employment in New Zealand. Where AES information is not available, we derive comparable measures from annual tax returns (IR10s). Enterprise total employment comes from LEED and comprises the count of employees in all of the enterprise's plants, annualised from employee counts as at the fifteenth of each month, plus working proprietor input, as reported in tax returns.

We restrict our attention to industries within the measured sector (Statistics New Zealand, 2010), for which productivity is more reliably measured. We also exclude the Insurance and Financial Services industry group, for which firm-level data were found to be unsuitable for production analysis.[21]

[20] Changes over time in current price inputs and outputs will reflect both quantity and price changes. We double deflate to isolate quantity adjustment over time at the (one- or two-digit) industry level using Statistics New Zealand's PPI input and output indices. Measures of productivity premia for firms within the same industry will reflect both quantity and relative price differences. Spatial price indices are not available.

[21] Non-measured industries are property services; ownership of owner-occupied dwellings; government administration and defence; education; and health and community services. Official industry productivity measures are available for the other industries that we exclude from firm-level analysis but these are derived using algorithms that rely on additional industry-level aggregates.

Production data are available at the enterprise level and an enterprise may operate in more than one location, and possibly outside the Auckland Urban Area. We use information on all enterprises that have some employment in the Auckland Urban Area. We estimate production functions using enterprise data, with local area attributes included as employment-weighted averages, averaged across all the locations where the enterprise operates. This approach is used for all area-level regressors in the production function regressions: employment composition and density, and proximity to amenities. For enterprises with operations outside the Auckland Urban Area, we set the value in non-Auckland locations to zero and include in the regression an additional variable that is the percent of the enterprise's employment that is outside Auckland. We also include a separate intercept for firms that operate only in the Auckland Urban Area. Table 2 summarises the enterprise-based data that are used for production function estimation.

The number of enterprises in Table 2 is less than half the number of plants shown in Table 1. This reflects a combination of multiple plants being represented by a single enterprise, and also the impact of dropping (mostly small) enterprises for which production data are not available. The employment counts in Table 2 are, however, larger for the production data than for the plant data. This is a result of including the non-Auckland Urban Area employment for enterprises that operate in the Auckland Urban Area. The final column of Table 2 shows that 94 percent of enterprises in the production data operate only in the Auckland Urban Area. The exceptions are, however, larger enterprises, with significant employment outside Auckland. As a result, enterprise employment in Table 2 is higher than plant employment in Table 1 for 13 of the 21 industries covered in the production data.

4.1.3 New entrants

The location choices of "new entrant" firms are used as the basis for identifying the correlates of desirable locations. A new entrant is identified as a plant that appears in an Auckland Urban Area meshblock for the first time. These plants could be part of a new enterprise – possibly the only plant in that enterprise – or they could be part of an enterprise that was operating in a previous period. New entrants that are part of existing enterprises may be new branches or relocated branches.[22] Many belong to enterprises that have previously operated in Auckland, though a minority are the enterprise's first entry into Auckland.

[22] Because entry is defined at the meshblock level, relocation between meshblocks within the same area unit would be captured as an entry.

We exclude from our analysis around 100,000 new entrants that have fewer than three FTE employees in their first year. We make these exclusions for two reasons. First, most are plants with no employees, representing the business locations of enterprises reporting only one or more working proprietors. The determinants of business location choices for such plants will be an unreliable guide to business location decisions generally, as they are likely to reflect the residential locations of the working proprietors. The second reason for excluding small entrants is that an unknown proportion of them may not be genuine entrants. Continuing businesses that change their legal or tax identity may incorrectly appear as entrants. For firms with larger employment, such "administrative churn" is adjusted for using information on the continuity of employees (Seyb, 2003). Such adjustment is not done for small firms.

Table 3 summarises the number of new entrants observed in the data. Over the eight years in which entry is observed, we observe 70,449 entrants. Of these, 56 percent (39,471) are for plants that belong to new enterprises. Of the remainder, the majority (29,346) are for plants that are part of enterprises that had previously operated in the Auckland Region, with a small number (1,632) entering the Auckland Urban Area from outside the Auckland Region.[23] The number of entrants each year is around eight to ten percent of the number of plants as reported in Table 1 for 2008.

The final column of Table 3 shows the total number of exits observed each year. An exit is defined as a plant being observed for the last time in a meshblock. As for the entrant counts, exits of small plants are excluded. We do, however, allow for low employment in the plant's final year – restricting instead to exits of plants that *ever* employed three or more employees.

Table 4 shows the number of entries and exits by industry. The number of entries is lowest for the three industries identified in Table 1 as having the lowest number of plants. For these three industries, the number of entrants across the eight years is actually smaller than the number of area units (333). In the final two columns of Table 4, we show for each industry the number of area units in which no entry is ever observed, and the number of area units in which no plants are ever observed. As discussed above, the absence of an industry

[23] To be classified as an entrant from outside Auckland, we require that the enterprise has entered the Auckland urban area from outside the Auckland Region, to exclude short-distance moves around the border of the urban area.

from an area unit may reflect a small number of plants, highly undesirable locations, or locations from which the industry is excluded due to land use restrictions.

4.2 Amenity data

We include measures of proximity to seven different local amenities. The amenities include transport infrastructure (motorway ramps, railway stations, airport, port), and access to local retail services (proxied by supermarkets and banks) and central city amenities (proximity to CBD). We also include a dummy variable for location within the CBD, to capture the extra impact of the CBD on location choice and productivity.[24]

Accessibility to the amenities is calculated at a finer spatial scale than area units – at meshblock level. The proximity of a meshblock to an amenity is measured as the straight-line distance from the meshblock centroid (geographic centre) to the nearest amenity. Area unit measures are then derived as an employment-weighted average across all meshblocks within the area unit.

Transport accessibility is captured by measures of distance to four transport facilities – the nearest motorway ramp, the nearest railway station, the nearest port, and Auckland International Airport. The railway station data are from a 2005 version of the LINZ Topographic Database. The distance to the nearest port is calculated as the minimum of the distance to the Port of Auckland, Onehunga Port, Tauranga Metroport, the East Tamaki inland port (from 2003), and the Wiri inland port (from 2006).[25]

Local service centres are identified by distance to the nearest supermarket and the distance to the nearest bank. Locations and contact details of bank branches around New Zealand were obtained from www.zenbu.co.nz, using information collected before 20 May 2008. Information on the location of supermarkets was also obtained from Zenbu, using data that were imported in 2008. The supermarket data were filtered to identify only major supermarkets, defined as those that belonged to the four major supermarket chains (New World, Foodtown, Pak'nSave, and Woolworths).[26]

The correlation between these various amenity measures may limit our ability to identify the influence of each separately. In order to investigate this possibility, we experimented with combining the various measures into general accessibility measures, using

[24] This was done in response to observed non-linearities in the density and land price gradients.
[25] Thanks to Richard Fabling and Lynda Sanderson for providing the necessary information, as used in their analysis of the impact of port location on exporting behaviour (Fabling et al., 2011).
[26] The processing of the data was done by Andrew Rae and Mairéad de Roiste of Victoria University.

principal component analysis. This would enable us to enter a smaller number of accessibility measures that capture the essential variation in the measures we use. We summarise this derivation of principal components in Appendix B. Having investigated the possible use of principal components in the location choice and productivity regressions, we found that they did not reveal more significant insights than those gained from the using the raw variables. We therefore choose to use the raw variables, for transparency and ease of interpretation.

Table 5 summarises the proximity of plants within the Auckland Urban Area to the measured amenities. Summary statistics are presented for each of the main industry groups.[27] Most firms are relatively close to supermarkets and banks, with a mean distance of less than 1.6 km. Similarly, for most industries, plants are, on average, only 3 km from a motorway ramp. Mean distances are longer to major transport connections such as railway stations (4–7 km) the airport (16–22 km) and a port (6–14 km), and to the CBD (8–19 km). The final column shows the proportion of plants in each industry that are in the CBD. This is highest for insurance and financial services (0.19), finance (0.17), government (0.17), and accommodation restaurants and hotels (0.15).

4.3 QVNZ Land Value

The land value measures used in this paper are based on valuation data obtained from Quotable Value New Zealand (QVNZ), which is New Zealand's largest valuation and property information company. QVNZ currently conducts legally required property valuations for rating (tax) purposes for over 80 percent of New Zealand local government areas (councils) – in earlier years QVNZ conducted valuations for all councils. The remaining councils use competing valuation companies to conduct their property valuations, but these data are purchased by QVNZ to create a complete database of all New Zealand properties. This database was matched by QVNZ to census meshblocks and made available to us in an aggregate form at the meshblock level on an annual basis. For each year, QVNZ assigns the most recent valuation to a property, and then aggregates all the properties at the meshblock level. Valuations are available using Statistics New Zealand's 2001 meshblock boundaries. These have been mapped to 2006 meshblock boundaries. Land value is measured as the total land value of all assessments divided by the total land area for all assessments. We restrict attention to valuations for the Auckland Urban Area.

[27] Note that the measure of proximity that is used in the regressions is a transformation of the median distance (km) that is summarised in the table. The regression covariate is -1*ln(distance).

Observations are for a category of land use for a meshblock in a valuation year. Valuations are carried out on a three-yearly cycle, which varies across Territorial Authorities. Data are available from 1990 for Papakura and Franklin, from 1991 for North Shore, Auckland, and Manukau, and from 1992 for Rodney and North Shore. Observations are dropped where the recorded land area is zero or if the number of assessments is less than three (combined loss of 6 percent of assessments, 10 percent of land value). Some observations appear to be outliers in terms of changes in land value per hectare or land area per assessment. Outliers are identified by regressing each of these variables on a set of year and indicator variables for each combination of meshblock and category, and selecting observations with large regression residuals in *both* regressions. Affected observations account for around 0.1 percent of assessments and 0.3 percent of aggregate land value. For these observations, land area per assessment is replaced with the mean value for the meshblock-category combination and land price per hectare is replaced with the ratio of total land value to the imputed mean multiplied by the number of assessments. To reduce remaining volatility, land price per hectare was smoothed using a three-year moving average across valuation years.

To create an annual land price series from the 3-yearly valuation data, we use annual data on property sales by area unit. (There are approximately 25 meshblocks in each area unit.) For each valuation year, we calculate the ratio of land price per hectare to median sales price, and linearly interpolate (and extrapolate for initial and final years, where necessary) this ratio. Multiplying the observed annual median sales price by this ratio generates an annual series for land price per hectare. To reduce remaining volatility, land price per hectare was smoothed using a three-year moving average. Land price per hectare for each area unit was calculated by aggregating land value and land area to area unit level and then calculating a ratio.

Variation in land prices is summarised in the first column of Table 6. The industries that are located disproportionately in areas with high land prices include the finance, insurance and financial services, and accommodation restaurants and hotels industries, which are also over-represented in the CBD.

4.4 Population composition

Information on the population density and population composition of area units in which firms locate is obtained from the Census of Population and Dwellings. Census data are

available for 1996, 2001 and 2006. For each area unit, population density is measured as an average over a 5 km circle around the area unit centroid, including all other area units whose centroids lie within 5 km. The shares of the population that are foreign born, new to the area, or degree qualified are measured over the same geographic range. Population composition and density are fairly stable over time within area units, compared with the marked differences between area units. We create an annual series by linear interpolation for inter-censal years, and extrapolation to 2007 and 2008.

Table 6 shows mean values, by industry, for each of the population-related measures. The cross-industry variation in density is positively correlated with land prices and proximity to the CBD, reflecting the strong central city land price gradient. There is relatively little cross-industry variation in the percent foreign born – ranging from 0.38 to 0.42, with the exception of the Agricultural industry (0.32) – or in the percent new to the area (0.51 to 0.57). The qualification structure of the local population varies somewhat more, ranging from 0.14 for Agricultural firms to 0.25 for Insurance and Financial Services, and Cultural and Recreational Services.

5 Business location patterns in Auckland

5.1 Summary of patterns

The outcomes of the location choices of Auckland firms are summarised graphically in this section by mapping the distribution of each industry's employment across the Auckland Urban Area. Further insights are provided by tabulating statistical measures that summarise the spatial distributions.

Industry-specific maps of the Auckland Urban Area for the year 2008 are shown in Figure 1. The maps are shaded, with darker areas indicating where employment is particularly highly concentrated. Specifically, the shading is based on values of Getis and Ord's (1992) index of spatial association (G*). The formula for G^* in area x is:

$$G_x^* = \frac{\left(Wp_x - \bar{p}\right)}{s\sqrt{\frac{N\sum_s w_{sx}^2 - 1}{N-1}}}, \qquad \text{where } s = \sqrt{\left(\sum_s \frac{p_s^2}{N}\right) - \bar{p}^2}$$

The industry's share of employment in area x is denoted p_x. We use a row-standardised weight matrix (W) that gives zero weight to area units with centroids more than

5 km from the area unit centroid, and with non-zero weights proportional to area unit population. *N* is the total number of area unit.

Under the null hypothesis that an industry's share of area unit employment varies randomly across area units, the statistic is distributed as a standard normal variable with mean of zero and a variance of 1. The areas with dark shading have a G* statistic greater than 1.96. If the spatial distribution were random, this would be expected to occur for around 2.5 percent of areas, with no particular spatial pattern to the occurrences. Similarly, light shading is used to indicate areas where the index is below -1.96, which is also expected to occur randomly for 2.5 percent of areas.

For presentational convenience, the 24 main industry groups that we analyse have been arranged in three classes of eight. The classification is subjective, and is based on visual similarities in mapped geographic concentration patterns. The classes are "Central" industries, which are to some extent over-represented in central Auckland; "Ring" industries, which are geographically concentrated in areas surrounding Auckland Central; and "Dispersed" industries, which have other concentration patterns, or no strong concentrations.

Figure 1a contains maps for the Central industries. The top row shows Business Services, Finance, Communications, and Insurance and Financial Services industries. All four of these have strong concentrations in and around central Auckland. The legend on the maps shows the number of high-concentration (dark) areas, which are between 52 and 70 for these four industries. This is well above the 2.5 percent (eight areas) that would be expected if location were random. Furthermore, the strong spatial clustering of high-concentration areas would not be expected if industry shares of area unit employment varied randomly. The lower row of industries (Print Manufacturing, Cultural and Recreational Services, Accommodation Restaurants and Hotels, and Government Administration) also have some areas of concentration in the central Auckland area, though the concentration is relatively weak for the last two industries. The Print Manufacturing industry is concentrated through to West Auckland, and also has an area of concentration on the North Shore. Government Administration has concentrations around Waitakere in the West, and around Takapuna and Birkenhead on the North Shore, reflecting centres of local and regional government.

Figure 1b shows comparable maps for Ring industries. The first map is for Wholesale Trade, which is concentrated in a broad ring around the central area. The other industries on Figure 1b are all manufacturing industries. The first three (Metal, Furniture, and

Petrochemical Manufacturing) have patterns similar to that of Wholesaling – following the main motorway to the North and South, and the rail line to the West. Paper Manufacturing has concentrations further removed from the central city, particularly in the West and South. The final three industries in Figure 1b are located away from the centre, and have smaller areas of concentration. Textile Manufacturing is concentrated in the West from New Lynn to Te Atatu, Equipment Manufacturing around East Tamaki, and Food Manufacturing from East Tamaki to Papakura.

The final eight industry groups have less pronounced patterns of concentration. The Transport industry is concentrated around the airport, and is also prominent around Waitakere in the West. Unsurprisingly, Agriculture is most prevalent on the fringes of the urban area – on the southern fringe towards Pukekohe, and on the northwest boundary towards Kumeu. The remaining industries have few areas of concentration – being geographically spread in much the same pattern as employment generally. Where there are concentrations, they tend to be in geographically larger and more sparsely occupied area units. These final six industries are all local service industries that may be expected to be evenly distributed in order to be close to customers (Retail Trade, Personal Services, Property and Equipment Hire, Health and Community Services, Construction, and Education).

Table 7 provides further information on the size and location patterns of the industries presented in Figure 1. The table includes two additional industries that were excluded from Figure 1 because of their small size (Non-metal Manufacturing, and a combined residual industry group containing the Mining industry and the Electricity, Gas and Water industry).

The first two columns show the (employment) size of the different industries, and their share of Auckland Urban Area employment. The Central industries account for about a third of employment and the Ring industries account for a further 20 percent. There is thus around 46 percent of employment that is in industries that have relatively weak concentration patterns across Auckland. The third column shows the "Firm Herfindahl" index, which is an indication of whether industry employment is dominated by relatively few firms. A value of 1 indicates that all industry employment in Auckland is in a single firm. The highest values are for the Finance (0.13), Communications (0.11) and Government (0.11) industries, and the residual Mining/Electricity, Gas and Water industry group (0.12). These industries will be spatially concentrated simply because of the limited number of firms.

Where industries are spatially concentrated, the proportion of local employment that is accounted for by their own industry will be higher in the area units where they locate than it is across the Auckland Urban Area overall. Business Services, for instance, accounts for 16.1 percent of Auckland Urban Area employment yet on average, they are in area units where Business Services firms account for 22 percent of employment. We show the 22 percent figure in the Table as the "isolation ratio". The difference between the isolation ratio and the overall employment share is an indication of the degree of spatial concentration. We express the difference as an index that lies between zero and one, as in Cutler et al. (1999), and show its value in the fifth column of Table 7.[28]

The isolation index conveys different information from that shown in Figure 1. The highest value of the isolation index (0.23) is for Health and Community Services – one of the Dispersed industries with the least pronounced concentration patterns in Figure 1. Although this industry is not concentrated across area units within any particular part of the Auckland Urban Area, there are particular area units that are dominated by Health and Community Services. This reflects the fact that hospitals are large in scale, and account for a large proportion of employment in the area units in which they operate. A similar pattern is evident for Education, with an isolation index of 0.15. Tertiary institutions are also large in scale, and thus dominate particular area units, even though the Education industry overall is dispersed across the urban area. Of the Dispersed industries, Transport and Retail Trade also have relatively high isolation, reflecting the fact that certain area units are dominated by large concentrations such as shopping malls and the airport.

The Central industries have somewhat high values of the isolation index. However, the central Auckland area units in which these industries are concentrated have a relatively diverse industry mix, so that the industries dominate their area units to a lesser extent than the Dispersed industries discussed in the previous paragraph. The exception is Government Administration, which has a very high index (0.18), reflecting the relatively large scale of local and regional government centres. Of the Ring industries, only the Wholesale industry, which often has co-located large facilities, has a high degree of isolation.

The index shown in the sixth column is an estimate of the correlation between location choices of firms within the same industry, using the approach of Maurel and Sédillot (1999). It is the probability that two randomly chosen firms in an industry will choose to

[28] The formula for the Isolation index is $(ir - p)/(1 - p)$ where p=proportion of Auckland employment, and ir is the isolation ratio.

locate in the same area unit, and controls for the concentration that arises from the presence of large firms. Using this measure, we find the Central industries have relatively high concentration. Among the industries grouped as Dispersed, that is, without a clear Central or Ring pattern, only the Transport industry shows a strong tendency for firms to cluster in the same area units.

The final column of Table 7 presents a commonly used measure of spatial autocorrelation – Moran's *I* index (Moran, 1950). This is conceptually quite different from the other measures in the table. It summarises not how concentrated an industry is within particular area units but whether the area units surrounding a high-concentration area unit also have high concentrations of industry employment. As with the Getis and Ord G* statistics shown in Figure 1, a radius of 5 km is used to identify surrounding area units. High spatial autocorrelation is evident for two of the Central industries – Business Services (0.25) and Insurance and Financial Services (0.16). Despite the strong spatial patterns shown for other Central industries in Figure 1, their degree of spatial autocorrelation is lower, suggesting a "patchier" distribution within the central Auckland area.

Three of the Dispersed industries also have high spatial autocorrelation: Agriculture (0.28), Transport (0.16) and Construction (0.34). This confirms that the concentration patterns seen in Figure 1 for these industries do in fact reflect co-location, and not just the presence of a few large firms in an area unit.

5.2 Regression estimates of location choice and productivity

The descriptive evidence presented in Figure 1 and Table 7 identifies distinct industry patterns of location for different industry groups. The observed patterns are consistent with a range of location choice factors. For instance, the concentration of business services in and around central Auckland may reflect the desire to locate near some physical amenity that is located centrally, such as a port; it may reflect a desire to locate together with other business service firms; or it may reflect the desirability of other features of the central area such as employment density, population density, or the diversity of industries. It is not possible to distinguish the relative strengths of these potential influences from the descriptive patterns alone. In this section, we use regression methods to estimate the strength of various possible location choice factors.

Two sets of regressions are estimated: first, the location choice regressions defined by equation 4; second, the production function regressions defined by equation 1. A full set

of regression estimates is presented in Appendix C. There is a separate table for each industry, with location choice estimates in the first two columns and the production function estimates in the final three columns.

The interpretation of the results can be illustrated by focusing on a single industry. One industry that yields interpretable results is the Accommodation, Restaurants and Hotels industry. In the location regressions for this industry, we find that proximity to supermarkets and banks have significant positive coefficients (0.26 and 0.23 respectively), indicating the attraction of local retail services to entering firms. A 10 percent decrease in the distance to supermarkets raises the probability of an area being chosen by 2.6 percent (from 1 chance in 333 to a 1.03 chance in 333). Entering accommodation firms are less likely to locate in areas with high employment density (coefficient of -0.289). The coefficient on land price in this regression is 0.134, suggesting that new entrants are attracted to areas with higher prices. In the productivity regressions, there are significant positive coefficients on proximity to motorways and ports, with motorway proximity having coefficients of 0.036 and 0.045 respectively. A 10 percent decline in the distance to motorways and ports is associated with 0.3 percent and 0.5 percent higher productivity.

A summary of statistically significant findings is presented in Table 8. This table contains two rows for each industry – the first summarising significant correlates of location choice, and the second summarising significant productivity correlates. The columns relate to the main variables of interest in the regressions. Statistically significant (at the 1% level of significance) positive coefficients are denoted by "+ +" in the location choice regressions and by "PP" in the production function regressions. Similarly, significant negative coefficients are denoted by "——" and "NN" respectively. For the location choice regressions, the indicators are based on coefficients from the negative binomial regression shown in column two of each of the Appendix tables, which instruments for land rents and area employment (as described in the methods section above).[29] The sample of locations for these regressions excludes area units in which the industry is never observed. The indicators for the productivity regressions are taken from the second to last column of each Appendix table. The final columns show firm fixed effects estimates. However, in the presence of fixed effects, the influence of time-invariant measures, such as the proximity to amenities, is identified only from the changing geographic spread of enterprises operating in multiple locations. Owing to limited variation,

[29] The instruments passed the Kleibergen-Papp test for weak instruments, with a p-value of 0.00. The control functions were, however, not significantly different from zero for most industries, implying that, conditional on the instruments being valid, endogeneity bias is not statistically significant.

the coefficients are imprecisely estimated, and sensitive to slight changes in specification. We rely instead on the estimates in the second to last column, which do not adjust for firm fixed effects.

For those expecting to find strong evidence of common location determinants across industries, the location choice patterns reported in Table 8 are disappointing. Although a number of statistically significant effects are identified, there is a lack of clear patterns that help us to understand firms' location choices more generally. The most consistent patterns are the positive influence on location choice of lagged exit rates, and the negative influence of employment density. The significance of lagged exits confirms the influence of firm turnover, and the availability of vacant premises, on location choices. A higher number of exits appears to be reflecting turnover effects rather than being a symptom of declining areas. The negative coefficients on employment density are consistent with a positive demand for land area. The coefficients on land prices are significantly negative for only two industries, but are significantly positive for six industries (Business Services, Insurance and Financial Services, Construction, Property and Equipment Hire, Health and Community Services, and Agriculture). We would expect that, controlling for characteristics of the local area, high land prices would make an area less attractive. Our interpretation of the positive coefficients is that there are features of local areas that are desirable for the particular industries but that are not captured by the measures that are included in the regression, possibly because of the spatial scale over which prices are measured. The included measures are a range of accessibility variables, employment composition measures, and spatially lagged land prices (to capture the effect of unobserved amenities that are spatially correlated). The coefficient on land prices is presumably reflecting the capitalised value of unmeasured amenities that are specific to the area unit – i.e., not correlated with unmeasured amenities in neighbouring area units. One potential factor may be the quality and type of existing commercial and residential buildings, which are not explicitly captured in our measures.

The negative influence of employment density is also somewhat puzzling, given the strong attraction of high density that is widely found in the literature. It may be that new entrant firms are less attracted to the most dense areas than are existing firms. It is, however, notable that six of the nine industries with negative coefficients on employment density also have significantly positive coefficients on land prices. Given the positive correlation between density and land prices, it may be that the regression wrongly attributes the attractiveness of high-density areas to high land prices rather than to density *per se*.

The role of proximity to transport infrastructure is a cornerstone of many traditional land use and transport planning models. It is captured in the regressions by distance to motorway ramps, railway stations, airport and port. The estimated impacts are surprisingly weak, since we are conditioning on price. Entering firms do not appear to be attracted to any of the transport infrastructure measures. The only significant positive coefficients on transport infrastructure in the location regressions are for the attraction of the finance industry to rail, which is puzzling, and of communication industry entrants to the airport. Positive productivity effects of transport infrastructure are observed, though only in five cases. Proximity to a port confers productivity advantages for the accommodation and transport industries. Motorway ramps are advantageous to accommodation and retail industry firms. Only firms in the equipment manufacturing industry are more productive when closer to the airport.

Entrants in the Accommodation, Restaurants and Hotels industry are attracted to retail centres (supermarkets and banks), as are retail firms. Personal Services firms, and those in the Health and Community Services industry, also show some attraction to retail centres.

We would have expected that local area characteristics that were positively related to productivity for an industry would also attract a disproportionate number of new entrants. This pattern is not generally evident in the regression results, though it does occur in two cases. The first exception is the Business Services industry, with entrants being attracted by proximity to the CBD and firms in the CBD being more productive. However, conditional on being outside the CBD, there is no significant productivity advantage – in fact, the productivity coefficient on proximity to the CBD is negative, though insignificant. The second exception is that retail firms are deterred by proximity to the CBD, and also less productive when closer to the CBD.

The influence of other factors emphasised by the neoclassical industrial location literature – localisation, urban diversity, and proximity to suppliers and customers – are also relatively weak. Localisation, as captured by the proportion of employment within a 5 km radius that is accounted for by own-industry employment, has a positive and significant influence on firm location for only four industries: Wholesale, Petrochemical, Agriculture, and Property and Equipment Hire. Proximity to input industries has a positive effect on location choice for entrants in only one industry: the Transport industry, for which it is also associated with higher productivity. Proximity to output industries is estimated to have a positive effect on location choice for only the Government industry. Finally, local industry

diversity is associated with relatively *low* productivity for firms in the retail and wholesale industries.

The findings for the influence of local population composition are similarly weak. Only entrants from the Equipment Manufacturing industry or the Construction industry appear to be attracted by population density. Locating where a high proportion of people new to the area is attractive for firms in the Accommodation, Business Services, and Property and Equipment Hire industries. Having highly qualified workers locally does not appear to influence location choices, but does lead to higher productivity for firms in the business services and construction industries.

Overall, the regression estimates do not reveal much beyond what was evident in the Figure 1 maps. This could be because there are determinants of location patterns that our data and econometric procedures fail to detect, or it could signify that the determinants of location choice of newly entering firms within the urban area are far from uniform. The diversity of observed choices is consistent with a growing literature that emphasises the increasing complexity of urban evolution (Anas et al., 1998). It is also consistent with the greater range of credible location choices that are available in a dispersed city such as Auckland that relies to a large extent on private car transportation (Frost, 1991; Bachels et al.., 1999).

6 Summary and discussion

In this paper, we summarise the geographic distribution of industries within the Auckland Urban Area, and estimate the determinants of location choice for firms that entered Auckland between 1999/2000 and 2007/08. We also estimate the relationship between firm productivity and locational attributes.

We summarise spatial distributions for 24 industry groups, which we classify under three headings based on broad patterns of location across Auckland, as shown in Figure 1. These are Central industries, which have concentrations of employment in the central areas of Auckland; Ring industries, which have their highest concentrations in areas surrounding central Auckland, and Dispersed industries, which have less pronounced general patterns of concentration. Statistical indicators of spatial distribution provide additional insights into each industry's spatial patterns.

To highlight the characteristics of areas that affect firms' location choices, we estimate, for each industry, a count-data (negative binomial) regression of how many firms

choose each of 333 small areas (area units) within the Auckland Urban Area, as a function of a set of observed area characteristics. In addition to local land prices and the employment size of the local area, we include as characteristics the distance of each area unit to selected transport infrastructure (motorway ramps, railway stations, airport, port), local services (banks, supermarkets, landfill), and consumption amenities (school, coast), along with a separate effect of being in the CBD. We also include measures of employment size and composition, which have been found to be important in previous agglomeration studies. We include employment density, industrial diversity, intensity of own-industry employment, and the intensity of input and output industries. We also estimate industry production functions with the same characteristics included as additional covariates.

Despite the clear spatial patterns evident for many industries, the location choice and production function regressions identify relatively few significant effects of the spatial amenity and composition measures that we include. This is somewhat surprising in the light of previous New Zealand studies that have found a consistent relationship between employment density and productivity or earnings (Maré and Graham, 2009; Williamson et al., 2008a), and the range of significant findings in the international agglomeration and industrial location literatures.

One potential explanation for our lack of significant findings is that agglomeration effects may operate most strongly across a different spatial scale. Our employment composition measures are defined over a circle of 5 km radius around each area unit. However, we initially tested our specifications measuring employment composition over 2 km and over 10 km, with largely similar results. Furthermore, existing studies have found significant effects at both larger and smaller spatial scales. Many agglomeration studies use larger spatial scales to examine variation between cities and regions, whereas we are looking at variation within a single city. Some existing studies of intra-metropolitan location choices use somewhat coarser geographical areas than we use. Arauzo-Carod and Viladecans-Marsal (2009), for instance, examine location choices between approximately 25 areas within each of 13 metropolitan areas. In contrast, we look at variation across over 300 area units within Auckland. Studies that look at finer spatial scales have also found significant results. For instance, Rosenthal and Strange (2008) find that human capital spillovers are strongest over very short distances (within 1 mile). A second potential explanation for our weak findings is that we may have omitted an important area characteristic. However, the measures that we use are similar to those used in previous studies, so we would expect to be able to detect any

agglomeration effects with our included variables. Finally, the relatively small number of entrants in the location choice regressions, and of enterprises in the productivity regressions may be a source of low precision, reducing our chances of detecting significant effects. The findings are, however, weak even for industries where the number of entrants and enterprises are in the thousands.

Overall, we conclude that location choices across Auckland and productivity differences within Auckland are not strongly and systematically related to the accessibility and employment composition measures that we include. Our study has been unable to identify systematic determinants of industrial location in Auckland. The complexity and diversity of location options and choices within Auckland cannot be well summarised by the sort of broad accessibility and composition measures that have been used in the industrial location literature. This increases the challenges of anticipating and planning for future business location patterns.

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Table 1: Plants in the Auckland Urban Area – size and area composition

			Share of local (5km) employment that is in				
	** Plants (2008)*	*Employment (rme 2008)*	*Own industry*	*Input industries*	*Output industries*	*Industry diversity*	*Empl density*
A_Agr	1,581	5,300	0.12	0.24	0.10	2.49	696
			(0.13)	(0.09)	(0.06)	(0.25)	(1065)
BD_Min_EGW	75	3,100	0.01	0.11	0.16	2.45	1675
			(0.02)	(0.09)	(0.14)	(0.22)	(1467)
C21_FoodMfrg	576	18,400	0.05	0.16	0.08	2.51	1479
			(0.06)	(0.06)	(0.04)	(0.15)	(1194)
C22_TextileMfrg	951	7,700	0.02	0.11	0.24	2.49	1694
			(0.02)	(0.04)	(0.05)	(0.17)	(1385)
C23_PaperMfrg	546	6,300	0.02	0.12	0.03	2.51	1050
			(0.03)	(0.04)	(0.01)	(0.17)	(854)
C24_PrintMfrg	1,113	12,500	0.03	0.13	0.42	2.44	1956
			(0.03)	(0.04)	(0.06)	(0.15)	(1458)
C25_Petrochem	633	12,200	0.04	0.24	0.35	2.53	1264
			(0.04)	(0.07)	(0.08)	(0.14)	(899)
C26_NonmetalMfrg	297	3,700	0.01	0.24	0.09	2.51	1299
			(0.02)	(0.07)	(0.04)	(0.16)	(1132)
C27_MetalMfrg	1,230	12,600	0.04	0.12	0.25	2.53	1147
			(0.04)	(0.04)	(0.06)	(0.15)	(850)
C28_EquipMfrg	1,998	20,400	0.05	0.26	0.24	2.50	1246
			(0.05)	(0.06)	(0.06)	(0.17)	(1109)
C29_FurnMfrg	1,137	7,500	0.02	0.26	0.25	2.50	1340
			(0.02)	(0.07)	(0.07)	(0.17)	(1112)
E_Construction	14,556	54,800	0.13	0.25	0.04	2.50	1096
			(0.08)	(0.08)	(0.01)	(0.19)	(1023)
F_Wholesale	7,845	66,300	0.11	0.19	0.55	2.47	1652
			(0.08)	(0.05)	(0.08)	(0.15)	(1284)
G_Retail	15,438	92,600	0.17	0.42	0.52	2.49	1599
			(0.12)	(0.07)	(0.06)	(0.17)	(1318)
H_Accomm	3,639	35,900	0.06	0.11	0.19	2.43	2196
			(0.04)	(0.04)	(0.05)	(0.17)	(1608)
I_Transport	4,839	38,600	0.07	0.18	0.18	2.51	1426
			(0.10)	(0.04)	(0.07)	(0.20)	(1253)
J_Commun	1,446	15,000	0.02	0.15	0.40	2.53	1327
			(0.03)	(0.07)	(0.07)	(0.20)	(1127)
K73_Finance	999	15,900	0.03	0.20	0.31	2.43	2219
			(0.03)	(0.08)	(0.08)	(0.16)	(1591)
K74K75_InsFinSer	1,953	14,500	0.03	0.16	0.13	2.41	2316
			(0.04)	(0.07)	(0.14)	(0.15)	(1602)
L77_PropEquipHir	7,989	19,400	0.05	0.16	0.30	2.45	1705
			(0.03)	(0.05)	(0.05)	(0.17)	(1420)
L78_Busserv	26,454	123,900	0.18	0.31	0.39	2.43	2001
			(0.09)	(0.05)	(0.06)	(0.16)	(1509)
M_Govt	231	21,400	0.05	0.25	0.33	2.46	2034
			(0.07)	(0.07)	(0.22)	(0.19)	(1595)
N_Education	2,373	53,000	0.12	0.41	0.27	2.49	1576
			(0.12)	(0.07)	(0.08)	(0.20)	(1334)
O_HealthCommunit	6,549	60,300	0.12	0.50	0.09	2.46	1865
			(0.11)	(0.08)	(0.03)	(0.16)	(1376)
P_CultRecrServ	4,092	21,300	0.04	0.27	0.31	2.42	2180
			(0.04)	(0.10)	(0.09)	(0.16)	(1519)
Q_PersServ	5,574	27,500	0.05	0.30	0.37	2.48	1645
			(0.04)	(0.09)	(0.07)	(0.18)	(1368)
Total	114,114	770,100	0.11	0.28	0.30	2.47	1658
			(0.10)	(0.12)	(0.18)	(0.18)	(1389)

Note: Statistics are for plants operating in the Auckland Urban Area. Unless otherwise stated, the statistics are based on all available years of data. Numbers in parentheses are standard deviations. Means and standard deviations are based on an unweighted sample of plants. Counts of plants and employment totals have been randomly rounded in accordance with Statistics New Zealand's confidentialisation policies. Totals may fail to add due to rounding.

Table 2: Enterprises operating in the Auckland Urban Area – production sample

	* *Enterprises (2008)*	*Employment (2008)*	*Ln(Gross Output)*	*Ln(Int Cons)*	*Ln(Cap Serv)*	*Ln(Tot Emp)*	*% only in Akld*
A_Agr	768	3,900	11.01	10.47	10.23	0.69	0.87
			(1.94)	(1.70)	(1.52)	(0.87)	(0.33)
C21_FoodMfrg	297	40,600	14.28	13.78	11.96	2.45	0.80
			(2.71)	(2.78)	(2.60)	(2.06)	(0.40)
C22_TextileMfrg	513	7,200	12.40	11.60	10.05	1.34	0.93
			(1.95)	(2.13)	(1.92)	(1.42)	(0.25)
C23_PaperMfrg	345	11,200	13.20	12.62	10.80	1.59	0.91
			(2.19)	(2.32)	(2.22)	(1.58)	(0.29)
C24_PrintMfrg	636	14,700	12.78	12.05	10.47	1.32	0.94
			(1.97)	(2.05)	(2.02)	(1.42)	(0.24)
C25_Petrochem	339	15,500	14.19	13.58	11.84	2.28	0.82
			(2.20)	(2.31)	(2.20)	(1.67)	(0.39)
C26_NonmetalMfrg	144	5,600	13.09	12.43	10.83	1.60	0.84
			(2.43)	(2.50)	(2.45)	(1.71)	(0.37)
C27_MetalMfrg	735	13,200	13.17	12.42	10.58	1.54	0.92
			(1.97)	(2.21)	(1.94)	(1.41)	(0.27)
C28_EquipMfrg	1,284	20,600	12.76	11.90	10.26	1.25	0.94
			(1.87)	(2.10)	(1.87)	(1.34)	(0.23)
C29_FurnMfrg	702	6,800	12.39	11.73	10.02	1.12	0.95
			(1.74)	(1.82)	(1.72)	(1.22)	(0.23)
E_Construction	8,100	54,600	11.94	11.28	8.90	0.53	0.96
			(1.54)	(1.71)	(1.52)	(0.92)	(0.19)
F_Wholesale	4,257	70,900	12.71	11.46	10.49	1.30	0.89
			(1.99)	(2.31)	(1.98)	(1.33)	(0.31)
G_Retail	7,641	116,000	11.61	10.00	10.26	0.98	0.95
			(1.59)	(1.82)	(1.56)	(1.14)	(0.22)
H_Accomm	1,836	31,100	12.41	11.73	10.89	1.35	0.96
			(1.42)	(1.38)	(1.44)	(1.28)	(0.19)
I_Transport	2,490	44,300	12.25	11.54	9.95	0.87	0.93
			(1.99)	(2.08)	(1.90)	(1.33)	(0.26)
J_Commun	666	26,200	11.41	10.53	9.06	0.45	0.94
			(1.76)	(1.86)	(1.85)	(1.31)	(0.23)
K73_Finance	279	31,300	13.48	12.43	11.13	1.40	0.88
			(2.41)	(2.51)	(2.68)	(1.86)	(0.32)
K74K75_InsFinSer	831	17,900	12.89	11.66	10.09	1.11	0.90
			(1.95)	(2.16)	(2.07)	(1.42)	(0.30)
L78_Busserv	13,764	122,400	11.76	10.39	9.14	0.58	0.96
			(1.57)	(1.76)	(1.76)	(1.06)	(0.20)
P_CultRecrServ	1,830	16,000	11.49	10.61	9.50	0.50	0.96
			(1.76)	(1.73)	(1.82)	(1.08)	(0.21)
Q_PersServ	2,235	12,700	11.51	10.63	9.67	0.62	0.97
			(1.37)	(1.34)	(1.55)	(0.98)	(0.18)
Total	49,692	682,700	12.03	10.94	9.74	0.85	0.94
			(1.79)	(2.02)	(1.88)	(1.22)	(0.23)

Note: Statistics are for enterprises with some employment in the Auckland Urban Area and for which production data are available. Unless otherwise stated, the statistics are based on all available years of data. Numbers in parentheses are standard deviations. Means and standard deviations are based on an unweighted sample of enterprises. Counts of enterprises and employment totals have been randomly rounded in accordance with Statistics New Zealand's confidentialisation policies. Totals may fail to add due to rounding.

Table 3: Number of entering and exiting plants

	New plant is part of an enterprise				
	that has previously operated in the Auckland Region	*that has previously operated, though not in the Auckland Region*	*that is new*	*Total entry of new plants*	*Total exits*
200103	3,672	237	4,455	8,364	6,186
200203	3,324	180	4,293	7,797	7,068
200303	3,099	159	4,698	7,956	6,969
200403	3,732	270	5,334	9,336	6,933
200503	3,885	210	5,361	9,456	8,295
200603	3,732	195	5,043	8,970	9,234
200703	4,029	186	5,217	9,432	9,855
200803	3,873	195	5,070	9,138	10,734
Total	29,346	1,632	39,471	70,449	65,277

Note: The definition of entrants excludes plants with fewer than three employees, for reasons given in the text. Exits are restricted to firms that ever employed three or more employees. Counts of entries and exits have been randomly rounded in accordance with Statistics New Zealand's confidentialisation policies. Totals may fail to add due to rounding.

Table 4: Number of entering and exiting plants – by industry

	Number of entries observed	*Number of exits observed*	*Number of area units with zero entry (max=333)*	*Number of area units in which the industry never appears*
A_Agr	654	849	124	10
BD_Min_EGW	93	93	284	249
C21_FoodMfrg	570	510	176	89
C22_TextileMfrg	669	771	139	30
C23_PaperMfrg	408	381	214	85
C24_PrintMfrg	900	996	150	43
C25_Petrochem	435	450	207	115
C26_NonmetalMfrg	246	219	236	128
C27_MetalMfrg	696	696	177	28
C28_EquipMfrg	1,161	1,218	116	8
C29_FurnMfrg	633	783	150	26
E_Construction	7,710	8,325	1	0
F_Wholesale	7,074	7,248	23	0
G_Retail	12,189	9,720	4	0
H_Accomm	4,527	3,033	25	2
I_Transport	2,658	2,775	26	0
J_Commun	618	708	105	5
K73_Finance	972	837	155	62
K74K75_InsFinServ	1,611	1,470	107	29
L77_PropEquipHire	3,471	3,273	33	0
L78_Busserv	13,170	12,360	5	0
M_Govt	162	237	267	190
N_Education	1,395	1,122	57	7
O_HealthCommunity	2,973	2,484	24	2
P_CultRecrServ	1,842	1,794	51	3
Q_PersServ	3,582	2,925	11	2
Total	70,449	65,277	0	0

Note: The definition of entrants excludes plants with fewer than three employees, for reasons given in the text. Exits are restricted to firms that ever employed three or more employees. Counts of entries and exits have been randomly rounded in accordance with Statistics New Zealand's confidentialisation policies. Totals may fail to add due to rounding.

Table 5: Plants in the Auckland Urban Area – access to amenities

	Mean distance (in km) to nearest							
	Super-market	*Motorway ramp*	*Railway station*	*Bank*	*Akld Airport*	*CBD*	*Port*	*% in CBD*
A_Agr	2.60	3.88	7.24	2.70	22.14	18.69	13.80	0.03
	(1.95)	(2.86)	(4.84)	(2.04)	(9.97)	(8.83)	(7.34)	(0.16)
BD_Min_EGW	1.56	2.95	5.31	1.25	17.56	12.23	7.77	0.09
	(1.51)	(3.38)	(5.17)	(1.62)	(9.72)	(8.77)	(7.44)	(0.28)
C21_FoodMfrg	1.10	2.59	4.36	1.03	16.30	11.52	6.82	0.05
	(0.82)	(1.97)	(3.46)	(0.94)	(7.24)	(6.49)	(5.44)	(0.22)
C22_TextileMfrg	1.01	2.54	4.41	0.96	17.61	10.21	7.24	0.06
	(0.83)	(2.16)	(4.23)	(0.90)	(7.47)	(6.89)	(5.57)	(0.23)
C23_PaperMfrg	1.30	2.86	5.83	1.27	18.81	13.74	9.19	0.01
	(1.11)	(2.22)	(4.74)	(1.16)	(9.58)	(6.89)	(6.60)	(0.10)
C24_PrintMfrg	0.97	2.13	4.85	0.87	18.67	8.87	6.67	0.06
	(0.77)	(1.97)	(4.13)	(0.83)	(7.34)	(6.50)	(5.34)	(0.25)
C25_Petrochem	1.16	2.32	4.73	1.14	16.67	11.90	7.09	0.01
	(0.87)	(1.88)	(3.72)	(0.97)	(7.41)	(5.77)	(5.27)	(0.11)
C26_NonmetalMfrg	1.35	2.72	5.30	1.33	17.85	12.95	8.34	0.01
	(1.12)	(2.26)	(4.41)	(1.17)	(8.47)	(7.40)	(6.26)	(0.10)
C27_MetalMfrg	1.25	2.68	5.06	1.27	17.14	13.13	7.92	0.01
	(0.99)	(2.18)	(4.26)	(1.06)	(8.57)	(6.66)	(6.13)	(0.09)
C28_EquipMfrg	1.32	2.92	5.60	1.32	18.52	12.69	8.37	0.02
	(1.17)	(2.53)	(4.74)	(1.25)	(8.67)	(6.92)	(6.14)	(0.15)
C29_FurnMfrg	1.17	2.80	5.17	1.16	18.17	11.67	8.19	0.02
	(1.03)	(2.36)	(4.42)	(1.10)	(8.30)	(6.60)	(5.87)	(0.13)
E_Construction	1.39	3.44	6.29	1.42	20.15	13.28	9.87	0.01
	(1.25)	(2.69)	(5.31)	(1.31)	(9.28)	(7.13)	(6.32)	(0.08)
F_Wholesale	1.10	2.38	5.08	0.99	17.73	10.45	6.84	0.04
	(0.88)	(2.17)	(4.31)	(0.95)	(7.98)	(6.52)	(5.42)	(0.20)
G_Retail	0.93	2.60	4.79	0.86	17.69	10.88	7.32	0.05
	(0.85)	(2.19)	(4.28)	(0.93)	(7.98)	(7.01)	(5.63)	(0.23)
H_Accomm	0.87	2.39	4.46	0.72	18.33	8.70	6.30	0.15
	(0.84)	(2.21)	(4.35)	(0.92)	(7.62)	(7.58)	(5.93)	(0.36)
I_Transport	1.13	2.95	4.53	1.10	16.37	11.92	7.46	0.07
	(0.95)	(2.38)	(3.98)	(1.08)	(8.05)	(7.15)	(5.42)	(0.25)
J_Commun	1.09	2.91	4.64	1.12	16.90	11.99	7.82	0.03
	(0.87)	(2.26)	(4.22)	(0.97)	(8.00)	(6.67)	(5.45)	(0.18)
K73_Finance	0.92	2.26	4.22	0.69	17.70	8.65	5.90	0.17
	(0.87)	(2.22)	(4.37)	(0.90)	(7.23)	(7.40)	(5.55)	(0.38)
K74K75_InsFinSer	0.96	2.21	4.80	0.75	19.26	7.82	6.06	0.19
	(0.84)	(2.12)	(4.48)	(0.91)	(7.12)	(6.94)	(5.50)	(0.39)
L77_PropEquipHir	1.15	2.91	5.40	1.06	19.05	10.40	7.68	0.06
	(1.06)	(2.47)	(4.67)	(1.13)	(8.04)	(7.33)	(5.92)	(0.23)
L78_Busserv	1.09	2.67	4.93	0.97	18.78	8.83	6.80	0.08
	(0.97)	(2.40)	(4.46)	(1.02)	(7.26)	(6.79)	(5.44)	(0.28)
M_Govt	0.80	2.12	3.95	0.65	17.10	9.73	6.35	0.17
	(0.75)	(2.05)	(3.99)	(0.83)	(8.03)	(7.90)	(5.95)	(0.38)
N_Education	1.05	2.84	4.82	1.03	17.72	10.92	7.47	0.06
	(0.93)	(2.34)	(4.23)	(1.02)	(7.77)	(7.07)	(5.47)	(0.23)
O_HealthCommunit	0.97	2.57	4.89	0.86	18.12	9.48	7.09	0.03
	(0.85)	(2.25)	(4.23)	(0.89)	(7.52)	(6.82)	(5.30)	(0.17)
P_CultRecrServ	1.05	2.45	4.32	0.98	18.41	7.97	6.58	0.06
	(1.00)	(2.33)	(4.03)	(1.04)	(6.55)	(6.77)	(5.27)	(0.24)
Q_PersServ	1.03	2.77	4.93	0.98	18.13	10.68	7.50	0.05
	(0.96)	(2.29)	(4.32)	(1.04)	(7.80)	(7.18)	(5.60)	(0.22)
Total	1.13	2.77	5.12	1.06	18.50	10.64	7.62	0.06
	(1.04)	(2.40)	(4.54)	(1.12)	(8.05)	(7.26)	(5.87)	(0.23)

Note: Statistics are for plants operating in the Auckland Urban Area. The statistics are based on all available years of data. Numbers in parentheses are standard deviations. Means and standard deviations are based on an unweighted sample of plants.

Table 6: Plants in the Auckland Urban Area – land prices and local population composition

			Share of local (5km) population aged 18 & over that is		
	log of land rents	*Population density*	*Foreign born*	*New to the area*	*Degree qualified*
A_Agr	12.79	655	0.32	0.51	0.14
	(1.68)	(614)	(0.10)	(0.06)	(0.08)
BD_Min_EGW	14.31	1244	0.38	0.54	0.20
	(1.68)	(673)	(0.09)	(0.06)	(0.11)
C21_FoodMfrg	14.32	1283	0.42	0.54	0.19
	(1.26)	(499)	(0.08)	(0.04)	(0.09)
C22_TextileMfrg	14.62	1371	0.40	0.55	0.21
	(1.20)	(553)	(0.07)	(0.04)	(0.09)
C23_PaperMfrg	13.93	1080	0.40	0.54	0.17
	(1.22)	(493)	(0.09)	(0.04)	(0.08)
C24_PrintMfrg	14.83	1459	0.40	0.56	0.23
	(1.18)	(556)	(0.06)	(0.04)	(0.09)
C25_Petrochem	14.18	1216	0.42	0.54	0.18
	(1.04)	(416)	(0.07)	(0.04)	(0.08)
C26_NonmetalMfrg	14.09	1171	0.40	0.54	0.18
	(1.31)	(535)	(0.09)	(0.04)	(0.09)
C27_MetalMfrg	14.06	1148	0.41	0.54	0.17
	(1.09)	(455)	(0.08)	(0.04)	(0.08)
C28_EquipMfrg	14.16	1158	0.40	0.54	0.18
	(1.21)	(516)	(0.08)	(0.04)	(0.08)
C29_FurnMfrg	14.28	1234	0.40	0.54	0.19
	(1.16)	(504)	(0.07)	(0.04)	(0.09)
E_Construction	14.26	1102	0.39	0.54	0.18
	(1.18)	(535)	(0.08)	(0.04)	(0.08)
F_Wholesale	14.55	1337	0.41	0.55	0.21
	(1.24)	(525)	(0.07)	(0.04)	(0.09)
G_Retail	14.62	1329	0.41	0.55	0.20
	(1.24)	(549)	(0.07)	(0.04)	(0.10)
H_Accomm	15.09	1503	0.40	0.57	0.24
	(1.33)	(614)	(0.07)	(0.05)	(0.10)
I_Transport	14.38	1246	0.41	0.54	0.18
	(1.31)	(546)	(0.08)	(0.05)	(0.10)
J_Commun	14.45	1232	0.41	0.54	0.18
	(1.09)	(507)	(0.08)	(0.04)	(0.09)
K73_Finance	15.12	1520	0.40	0.56	0.24
	(1.36)	(588)	(0.07)	(0.04)	(0.10)
K74K75_InsFinSer	15.29	1563	0.40	0.57	0.25
	(1.32)	(593)	(0.06)	(0.04)	(0.09)
L77_PropEquipHir	14.76	1339	0.40	0.55	0.22
	(1.30)	(579)	(0.07)	(0.05)	(0.09)
L78_Busserv	15.01	1460	0.40	0.56	0.24
	(1.23)	(571)	(0.07)	(0.04)	(0.09)
M_Govt	14.82	1440	0.40	0.55	0.21
	(1.46)	(595)	(0.07)	(0.05)	(0.11)
N_Education	14.61	1309	0.41	0.55	0.20
	(1.21)	(547)	(0.07)	(0.05)	(0.10)
O_HealthCommunit	14.89	1428	0.40	0.56	0.23
	(1.13)	(546)	(0.07)	(0.04)	(0.09)
P_CultRecrServ	14.97	1500	0.39	0.57	0.25
	(1.23)	(579)	(0.06)	(0.05)	(0.09)
Q_PersServ	14.70	1339	0.41	0.55	0.21
	(1.21)	(569)	(0.07)	(0.05)	(0.09)
Total	14.65	1326	0.40	0.55	0.21
	(1.30)	(577)	(0.07)	(0.05)	(0.09)

Note: Statistics are for plants operating in the Auckland Urban Area. The statistics are based on all available years of data. Numbers in parentheses are standard deviations. Means and standard deviations are based on an unweighted sample of plants.

Table 7: Industry concentration profiles (2007/08 year)

Row Labels	*RME empl*	*Share of total emp*	*Firm Herfin-dahl*	*Isolation ratio*	*Isolation index*	*Maurel-Sedillot conc index*	*Moran's I (radius 5 km)*
Central Industries	**260,400**	**33.8%**					
L78_Busserv	123,900	16.1%	0.00	22.0%	0.07	0.01	0.25
K73_Finance	15,900	2.1%	0.13	8.4%	0.06	0.07	0.04
J_Commun	15,000	1.9%	0.11	9.3%	0.08	0.07	0.02
K74K75_InsFinServ	14,500	1.9%	0.02	3.7%	0.02	0.10	0.16
C24_PrintMfrg	12,500	1.6%	0.02	4.2%	0.03	0.02	0.01
P_CultRecrServ	21,300	2.8%	0.02	7.1%	0.04	0.06	0.10
H_Accomm	35,900	4.7%	0.01	7.3%	0.03	0.01	0.06
M_Govt	21,400	2.8%	0.11	20.6%	0.18	0.06	0.01
Ring Industries	**151,400**	**19.7%**					
F_Wholesale	66,300	8.6%	0.00	15.3%	0.07	0.02	0.00
C27_MetalMfrg	12,600	1.6%	0.00	4.1%	0.02	0.03	0.05
C29_FurnMfrg	7,500	1.0%	0.01	2.5%	0.02	0.02	0.01
C25_Petrochem	12,200	1.6%	0.01	5.0%	0.03	0.04	0.09
C23_PaperMfrg	6,300	0.8%	0.02	3.4%	0.03	0.05	0.11
C22_TextileMfrg	7,700	1.0%	0.01	3.2%	0.02	0.01	0.02
C28_EquipMfrg	20,400	2.6%	0.01	6.7%	0.04	0.05	0.05
C21_FoodMfrg	18,400	2.4%	0.02	6.6%	0.04	0.03	0.03
Dispersed Industries	**351,500**	**45.6%**					
A_Agr	5,300	0.7%	0.01	6.8%	0.06	0.02	0.28
I_Transport	38,600	5.0%	0.03	15.8%	0.11	0.11	0.16
G_Retail	92,600	12.0%	0.01	20.1%	0.09	0.00	-0.07
E_Construction	54,800	7.1%	0.00	13.1%	0.06	0.00	0.34
L77_PropEquipHire	19,400	2.5%	0.00	2.9%	0.00	0.00	0.09
Q_PersServ	27,500	3.6%	0.02	7.2%	0.04	0.00	-0.03
O_HealthCommunity	60,300	7.8%	0.04	28.9%	0.23	0.01	-0.01
N_Education	53,000	6.9%	0.02	20.4%	0.15	0.01	0.02
Excluded Industries	**6,800**	**0.9%**					
BD_Min_EGW	3,100	0.4%	0.12	2.8%	0.02	0.14	0.01
C26_NonmetalMfrg	3,700	0.5%	0.03	2.2%	0.02	0.05	0.16
Grand Total	**770,100**	**100.0%**					

Note: Employment totals have been randomly rounded in accordance with Statistics New Zealand's confidentialisation policies. Totals may fail to add due to rounding. Other measures are described in the text.

Table 8: Summary of regression estimates

		Land Price	CBD indicator	Amenities: proximity to							Employment composition within 5 km						Population composition within 5 km				Turnover	
				Supermarket	Motorway ramp	Railway	Bank	Airport	CBD	Port	AU Employment density	Nbd Employment density	Own industry share	Input industries	Output industries	Diversity	Population density	% Migrant	% New to area	% high skilled	Lagged exits	Lagged own-industry exits
L78 Busserv	Location	++							++		– –								++		++	++
	Production		**PP**									**PP**								**PP**		
K73 Finance	Location					++	++														++	
	Production																					
J Commun	Location							++	++					– –							++	
	Production																					
K74K75 InsFinServ	Location	++	++								– –			– –							++	++
	Production																					
C24 PrintMfrg	Location		– –					– –													++	
	Production																					
M Govt	Location														++							
	Production																					
H Accomm	Location			++			++				– –								++		++	++
	Production				**PP**					**PP**												
P CultRecrServ	Location								++													
	Production		**NN**				**PP**															
F Wholesale	Location						– –					– –	++								++	++
	Production															**NN**						
C27 MetalMfrg	Location										– –										++	
	Production																					
C29 FurnMfrg	Location				– –							– –									++	
	Production																					
C25 Petrochem	Location	– –					– –						++									
	Production			**PP**																		
C23 PaperMfrg	Location	– –			– –	++		– –	– –										– –			
	Production							**NN**														
C22 TextileMfrg	Location																				++	
	Production																					
C28 EquipMfrg	Location						– –	– –									++	– –				++
	Production							**PP**														
C21 FoodMfrg	Location																		– –			
	Production													**PP**								
A Agr	Location	++	++								– –		++									
	Production																					
I Transport	Location										– –			++							++	++
	Production			**NN**			**PP**		**NN**	**PP**				**PP**								
G Retail	Location			++			++	– –	– –												++	++
	Production			**NN**	**PP**				**NN**							**NN**						
E Construction	Location	++					– –	– –	– –		– –						++				++	++
	Production		**PP**																	**PP**		
L77 PropEquipHire	Location	++									– –		++						++		++	
	Production																					
Q PersServ	Location			++														++			++	++
	Production																					
O Health&Comm'y	Location	++					++				– –											++
	Production																					
N Education	Location																					
	Production																					

Notes: Location coefficients: significant positive (++ = at 1%;); significant negative (– – = at 1%). Production coefficients: significant positive (PP = at 1%); significant negative (NN = at 1%). Full regression estimates are included as Appendix C.

Figure 1a: Industry distribution across Auckland Urban Area – Central industries
Getis & Ord G* index of local concentration

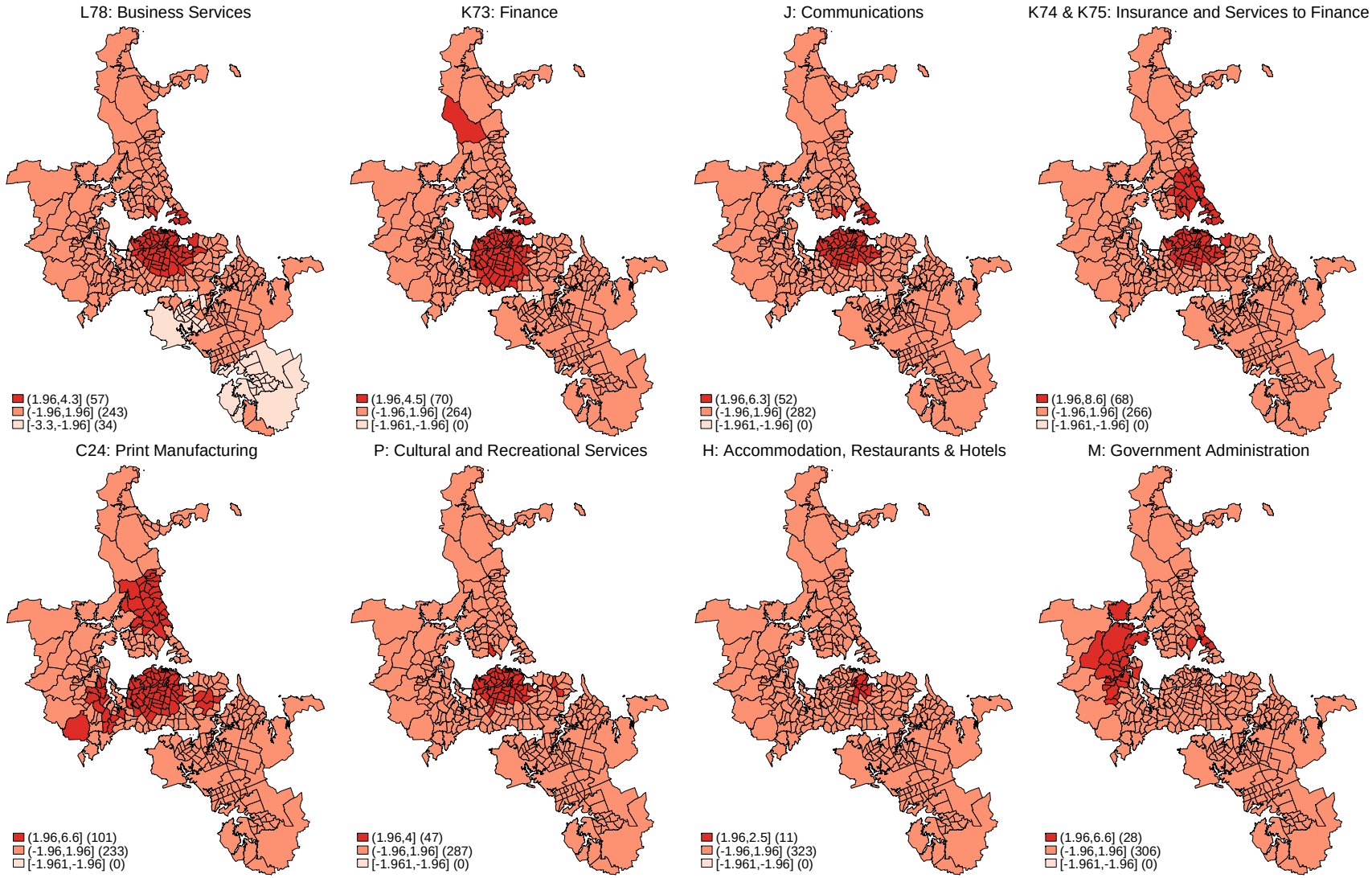


Figure 1b: Industry distribution across Auckland Urban Area – Ring industries
Getis & Ord G* index of local concentration

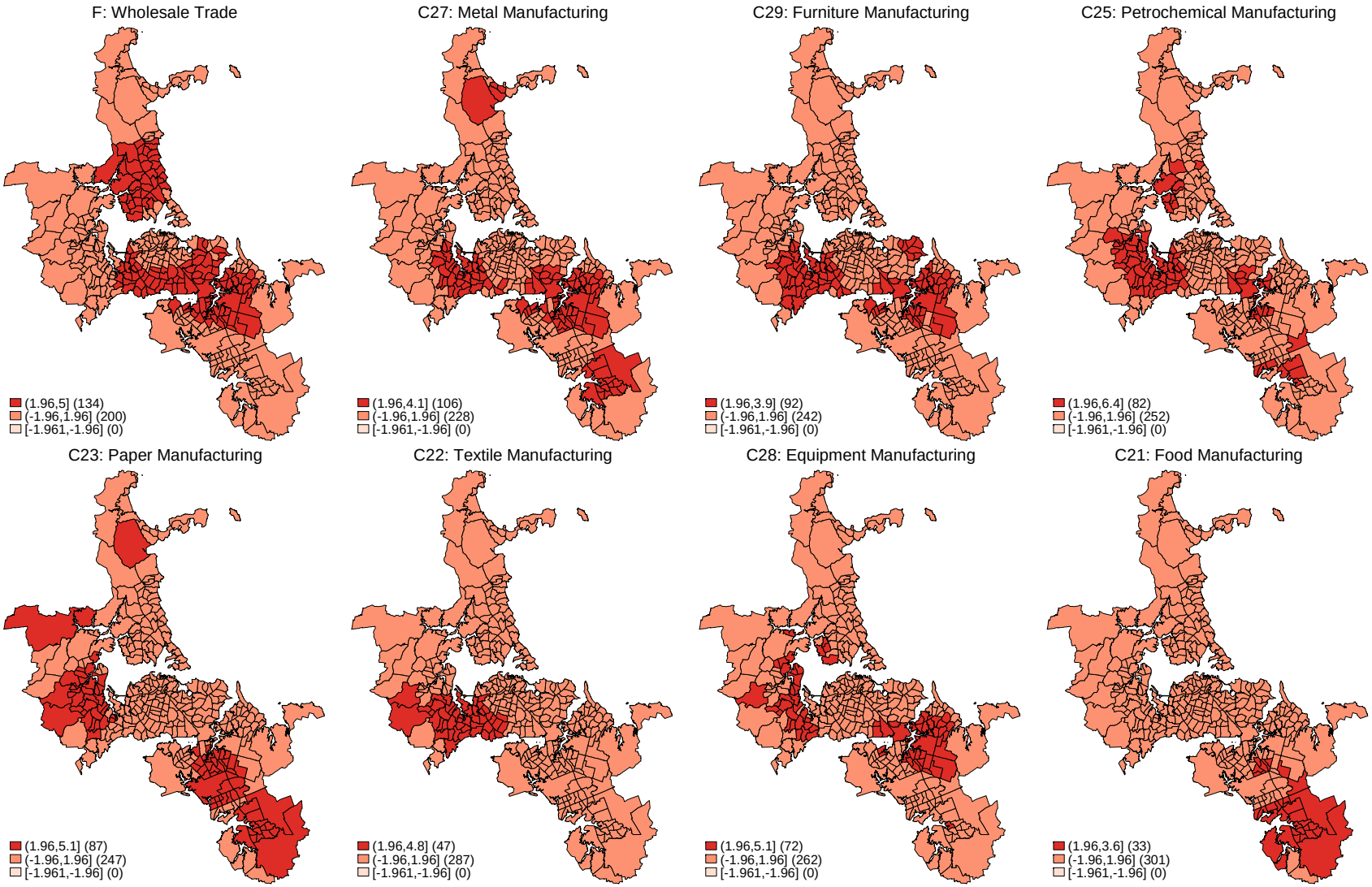
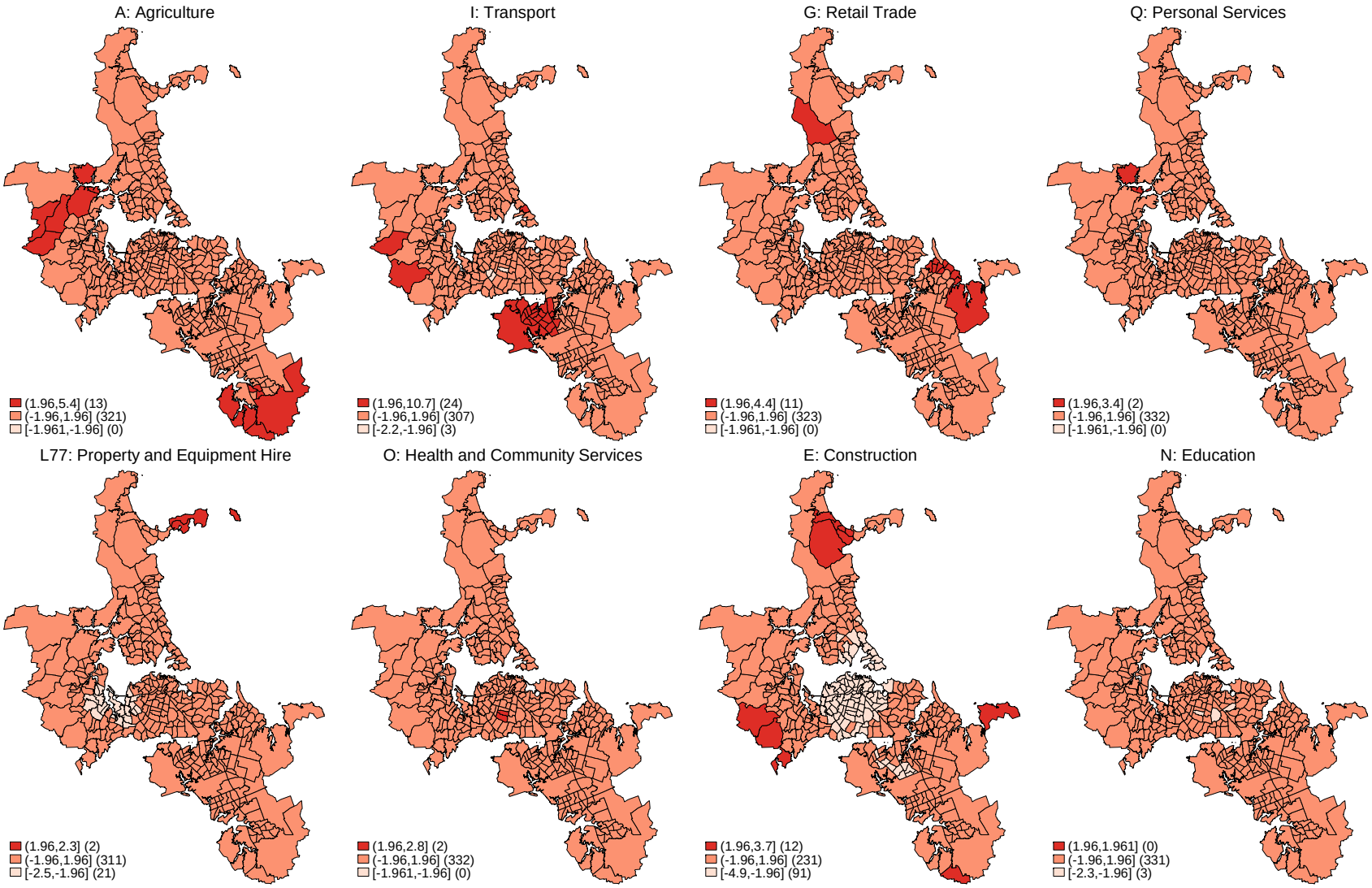


Figure 1c: Industry distribution across Auckland Urban Area – Dispersed industries
Getis & Ord G* index of local concentration



Appendix A: Industry classifications and input-output links

Industry grouping	*As identified in inter-industry transactions table*		*Input industries*	*Output industries*
A_Agr	1	Horticulture and fruit growing	5, 18, 26, 30, 31, 37, 43	3, 12, 31, 32
A_Agr	2	Livestock and cropping farming	2, 5, 18, 30, 37	2, 30
A_Agr	3	Dairy cattle farming	2, 5, 18, 30, 31, 37	2, 10
A_Agr	4	Other farming	5, 18, 30, 36, 37, 43	10
A_Agr	5	Services to agriculture, hunting and trapping	5, 18, 30, 31, 43	2, 6, 10
A_Agr	6	Forestry and logging	5, 6, 33	6, 15
A_Agr	7	Fishing	7, 23, 37, 43	12
BD_Min_EGW	8	Mining and quarrying	8, 9, 29, 43	8, 20, 21, 29
BD_Min_EGW	9	Oil & gas exploration & extraction	9, 29, 43	9. 18, 27
C21_FoodMfrg	10	Meat and meat product manufacturing	3, 4, 10, 30, 33	10, 30, 31
C21_FoodMfrg	11	Dairy product manufacturing	2, 11, 19, 30, 43	11, 30
C21_FoodMfrg	12	Other food manufacturing	7, 12, 30	12, 32
C21_FoodMfrg	13	Beverage, malt and tobacco manufacturing	1, 12, 22, 30, 43	32
C22_TextileMfrg	14	Textile and apparel manufacturing	10, 14, 30	14, 30, 31
C23_PaperMfrg	15	Wood product manufacturing	6, 15	15, 25
C23_PaperMfrg	16	Paper & paper product manufacturing	6, 16, 26, 30	16, 17
C24_PrintMfreg	17	Printing, publishing & recorded media	16, 17, 30	17, 30, 31, 43
C25_Petrochem	18	Petroleum and industrial chemical manufacturing	9, 18, 30	2, 3, 18, 19, 29
C25_Petrochem	19	Rubber, plastic and other chemical product manufacturing	18, 19, 30, 43	11, 12, 17, 19, 29, 30, 31
C26_NonMetalMfrg	20	Non-metallic mineral product manufacturing	8, 20, 30, 43	29
C27_MetalMfrg	21	Basic metal manufacturing	8, 21, 22, 26	22, 24
C27_MetalMfrg	22	Structural, sheet and fabricated metal product manufacturing	21, 22, 30	22, 24, 29, 31
C28_EquipMfrg	23	Transport equipment manufacturing	22, 23, 30, 31	23, 29, 31, 35
C28_EquipMfrg	24	Machinery & equipment manufacturing	21, 22, 30, 43	24, 29, 30, 36
C29_FurnMfrg	25	Furniture and other manufacturing	15, 22, 30, 43	29, 31, 40, 41
BD_Min_EGW	26	Electricity generation and supply	9, 43	10, 12, 15, 16, 21, 30, 31, 46
BD_Min_EGW	27	Gas supply	9, 27	18, 27
BD_Min_EGW	28	Water supply	28	28, 41
E_Construction	29	Construction	20, 24, 30, 43	40, 41, 45
F_Wholesale	30	Wholesale trade	2, 11, 17, 30, 33, 36, 40	12, 14, 19, 22, 24, 29, 30, 31, 43
G_Retail	31	Retail trade	10, 17, 30, 31, 40, 43	2, 3, 29, 30, 31, 32, 33, 43
H_Accom	32	Accommodation, restaurants and bars	10, 12, 13, 30	35, 44, 46, 47
I_Transport	33	Road transport	31, 33	6, 10, 30, 33
I_Transport	34	Water and rail transport	34, 35, 43	8, 10, 30, 34
I_Transport	35	Air transport, services to transport and storage	35, 42, 43	30, 43, 35
J_Commun	36	Communication services	36, 43	30, 31, 36, 43, 44
K73_Finance	37	Finance	37, 43	30, 37, 40, 41, 43
K7475_InsFinServ	38	Insurance	39	2, 29, 30, 31, 37, 40, 41, 43, 47
K7475_InsFinServ	39	Services to finance and insurance	39, 43	38, 39
L77_PropEquipHire	40	Real estate	29, 37, 40	30, 31, 35, 42, 43, 44, 45
L77_PropEquipHire	41	Ownership of owner-occupied dwellings	29, 37	n/a
L77_PropEquipHire	42	Equipment hire and investors in other property	31, 37, 42, 43	30, 31, 35, 42, 43, 44, 45
L78_BusServ	43	Business services	17, 30, 31, 36, 37, 40	26, 29, 31, 36, 37, 44, 45, 47, 48
M_Govt	44	Central government administration, defence, public order and safety services	29, 36, 40, 43	29, 30, 31, 40, 43, 44, 47
M_Govt	45	Local government administration services and civil defence	29, 43, 45	45
N_Education	46	Education	26, 29, 30, 36, 43, 46	43, 44, 46, 49
O_Health_Community	47	Health and community services	30, 31, 37, 43, 47	47
P_CultRecrServ	48	Cultural and recreational services	36, 40, 43, 48	30, 43, 48
Q_PersServ	49	Personal and other community services	17, 37, 43, 46, 49	29, 43, 44, 45, 47, 49

Appendix B: Principal component analysis of amenity measures

The seven proximity measures are combined into seven principal components (PC). Each PC is a linear combination of the seven measures. By construction, they are uncorrelated. The first PC is the one accounting for the highest proportion of variance.

The following output reports the statistical output obtained by running the PC analysis in Stata®, using one observation for each meshblock in the Auckland Urban Area (smaller areas than area units). The first PC accounts for 38 percent of the total variance. However, even the seventh component accounts for 3.9 percent of the variance. The main disadvantage of using PCs is that it may be difficult to interpret what each component is capturing. The table headed "Principal Components (eigenvectors)" shows the weighting that each of the nine amenities is given in each of the PCs. Some correspondence between the PCs and the amenities is evident. The first component captures the relatively high accessibility for denser, central areas. The second reflects rail, air, and sea access. The third gives relatively high weight to central areas that are not close to banks and supermarkets. The fourth and fifth capture non-central rail and motorways respectively. The sixth reflects areas that are close to supermarkets but not close to banks. The seventh gives high weight to airport proximity. The figure that follows shows maps of each of the first six principal components (mapped as area unit averages). The map of the seventh component has only the airport highlighted. Having investigated the possible use of PCs in the location choice and productivity regressions, we chose to use the raw variables, for ease of interpretation.

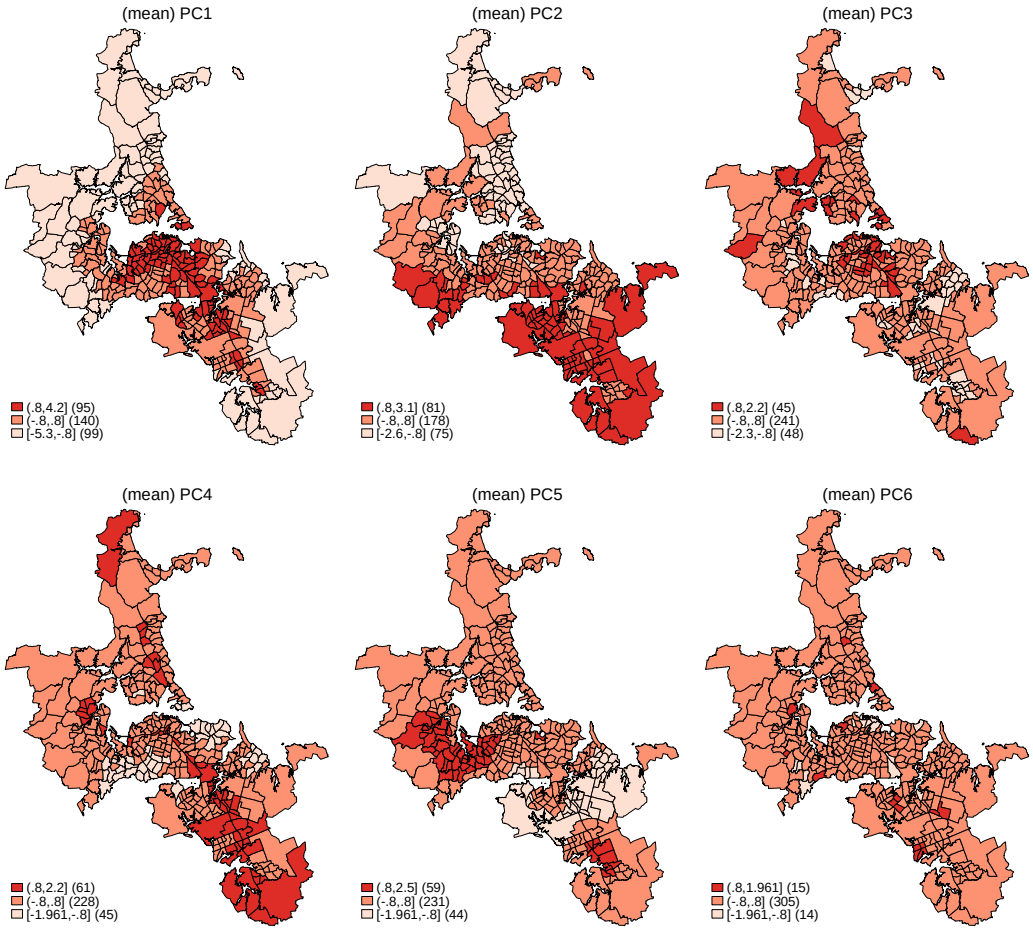
```
. pca nr_*, vce com(7)

Principal components/correlation                  Number of AUs    =      8837
                                                  Number of comp. =         7
                                                  Trace            =         7
    Rotation: (unrotated = principal)             Rho              =    1.0000
    ------------------------------------------------------------------------------
       Component |   Eigenvalue   Difference         Proportion   Cumulative
    -------------+----------------------------------------------------------------
           Comp1 |      2.67677      1.29208             0.3824       0.3824
           Comp2 |      1.38469      .511309             0.1978       0.5802
           Comp3 |      .873381      .102838             0.1248       0.7050
           Comp4 |      .770543     .0661626             0.1101       0.8151
           Comp5 |       .70438      .390264             0.1006       0.9157
           Comp6 |      .314116     .0379979             0.0449       0.9606
           Comp7 |      .276118            .             0.0394       1.0000
    ------------------------------------------------------------------------------
```

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6
nr_smkt	0.4298	-0.3112	-0.5002	-0.1311	0.0121	0.6296
nr_mway	0.3196	-0.2878	0.2494	0.8351	0.1041	0.0818
nr_rail	0.3621	0.3678	0.0264	-0.0252	0.7750	-0.1811
nr_bank	0.4523	-0.3476	-0.3206	-0.1926	-0.0752	-0.6630
nr_air	0.3019	0.6578	-0.1561	0.0100	-0.1445	0.2280
nr_CBD	0.3146	-0.2267	0.7172	-0.4902	0.0566	0.2177
nr_port	0.4328	0.2831	0.2130	0.0854	-0.5990	-0.1586

Variable	Comp7	Unexplained
nr_smkt	-0.2333	0
nr_mway	0.1947	0
nr_rail	-0.3145	0
nr_bank	0.2993	0
nr_air	0.6156	0
nr_CBD	0.2104	0
nr_port	-0.5440	0

Map of first six principal components of amenity measures (Auckland Urban Area)



Appendix C: Full set of regression estimates

	Location Choice Regressions			*Production Function Regressions*		
INDUSTRY: A_Agr	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	-0.399**	0.341**	log(Intermed)	0.896**	0.892**	0.567**
	(0.084)	(0.114)		(0.0186)	(0.0204)	(0.0198)
Log of land price within 5km	-0.277**	-0.004	log (Capital)	0.0303	0.0469*	0.156**
	(0.107)	(0.150)		(0.0165)	(0.0234)	(0.0168)
log of AU employment	0.563**	0.323**	log(Emplt)	0.203**	0.185**	0.277**
	(0.070)	(0.108)		(0.0268)	(0.0300)	(0.0288)
CBD indicator		1.346**	CBD indicator		-0.28	0.35
		(0.432)			(0.301)	(0.314)
Near Supermarket (§)		0.032	Near Supermarket (§)		0.026	0.124
		(0.110)			(0.0590)	(0.0803)
Near Motorway ramp (§)		0.061	Near Motorway ramp (§)		-0.0642	-0.0439
		(0.080)			(0.0336)	(0.0503)
Near Railway Station (§)		0.076	Near Railway Station (§)		-0.0265	0.0972
		(0.080)			(0.0474)	(0.0821)
Near Bank (§)		-0.091	Near Bank (§)		0.0282	-0.064
		(0.115)			(0.0565)	(0.0761)
Near Airport (§)		-0.04	Near Airport (§)		-0.0352	-0.0282
		(0.159)			(0.0634)	(0.108)
Near CBD(§)		-0.147	Near CBD(§)		0.000816	-0.383**
		(0.199)			(0.100)	(0.131)
Near Port (§)		0.138	Near Port (§)		0.0461	0.0561
		(0.106)			(0.0619)	(0.0441)
Lagged log of empl within 5km		0.203	Log of empl within 5km		0.13	0.186
		(0.189)			(0.0920)	(0.118)
Lagged own emp share (5km)		6.507**	Own emp share (5km)		0.706	0.653
		(2.212)			(0.760)	(0.720)
Lagged input ind share (5km)		-0.943	Input ind share (5km)		0.669*	-0.0508
		(0.537)			(0.329)	(0.275)
Lagged output ind share (5km)		0.206	Output ind share (5km)		-0.0291	-0.862*
		(0.951)			(0.465)	(0.378)
Lagged industrial diversity		-0.295	Industrial diversity		0.147	0.181
		(0.415)			(0.121)	(0.0989)
AU Emp Density §§		-0.866**				
		(0.119)				
Emp density within 5km §§		-0.264	Emp density within 5km §§		0.00167	0.403
		(0.265)			(0.122)	(0.211)
ln Population Density (5km)		-0.118	ln Population Density (5km)		0.000933	-0.166
		(0.238)			(0.0670)	(0.103)
Population: % Migrant		-0.716	Population: % Migrant		-0.335	-0.572
		(0.886)			(0.350)	(0.650)
Population: % New to area		0.524	Population: % New to area		-0.48	0.338
		(1.906)			(0.908)	(0.598)
Population: % DegreeQual		-2.071	Population: % DegreeQual		-0.685	1.386
		(1.786)			(0.641)	(0.829)
log of lagged exits		-0.234	% non-Akld Emp		1.634	0.366
		(0.125)			(0.863)	(1.152)
ln(lag own ind exits)		0.177	Only in Auckland		0.0146	0.0101
		(0.095)			(0.121)	(0.0885)
AU count	2,664	2,584	Observations	7,926	7,926	7,926
log likelihood	-1427	-1295	* distinct firms			2,247
Negbin Dispersion (log)	-0.217	-2.954*	R-squared	0.712	0.719	0.389
	(0.230)	(1.239)	RTS	1.129**	1.124**	1
Negbin Dispersion	0.805	0.052	RTSse	(0.017)	(0.017)	(0.031)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

INDUSTRY:	*Location Choice Regressions*	*Production Function Regressions*

C21_FoodMfrg	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	-0.189	-0.123	log(Intermed)	0.658**	0.659**	0.542**
	(0.098)	(0.130)		(0.0337)	(0.0297)	(0.0415)
Log of land price within 5km	0.085	0.463	log (Capital)	0.108**	0.0994**	0.0896**
	(0.155)	(0.306)		(0.0310)	(0.0301)	(0.0229)
log of AU employment	1.015**	0.773**	log(Emplt)	0.300**	0.307**	0.320**
	(0.061)	(0.126)		(0.0398)	(0.0362)	(0.0415)
CBD indicator		0.175	CBD indicator		-0.390	-0.367
		(0.493)			(0.222)	(0.360)
Near Supermarket (§)		-0.147	Near Supermarket (§)		0.0163	0.0970
		(0.106)			(0.0292)	(0.0517)
Near Motorway ramp (§)		-0.239*	Near Motorway ramp (§)		-0.0129	0.0273
		(0.120)			(0.0266)	(0.0350)
Near Railway Station (§)		-0.029	Near Railway Station (§)		0.0446	0.003
		(0.081)			(0.0253)	(0.0493)
Near Bank (§)		-0.013	Near Bank (§)		-0.0288	-0.0289
		(0.112)			(0.0274)	(0.0296)
Near Airport (§)		-0.466*	Near Airport (§)		0.0173	-0.12
		(0.198)			(0.0485)	(0.112)
Near CBD(§)		-0.025	Near CBD(§)		0.067	0.0782
		(0.224)			(0.0743)	(0.110)
Near Port (§)		-0.084	Near Port (§)		0.0246	0.00366
		(0.114)			(0.0218)	(0.0192)
Lagged log of empl within 5km		0.459	Log of empl within 5km		-0.0467	0.0316
		(0.241)			(0.0588)	(0.0970)
Lagged own emp share (5km)		7.483*	Own emp share (5km)		-0.949	-0.615
		(3.660)			(0.813)	(0.845)
Lagged input ind share (5km)		-0.019	Input ind share (5km)		1.294**	0.903*
		(0.799)			(0.351)	(0.409)
Lagged output ind share (5km)		2.02	Output ind share (5km)		-0.224	-0.146
		(1.513)			(0.257)	(0.308)
Lagged industrial diversity		0.944	Industrial diversity		-0.260	-0.0175
		(0.708)			(0.141)	(0.123)
AU Emp Density §§		-0.023				
		(0.146)				
Emp density within 5km §§		-0.169	Emp density within 5km §§		-0.0623	-0.0651
		(0.329)			(0.0967)	(0.152)
ln Population Density (5km)		-0.275	ln Population Density (5km)		-0.00704	0.123
		(0.334)			(0.0569)	(0.0979)
Population: % Migrant		1.219	Population: % Migrant		-0.41	0.0167
		(1.304)			(0.295)	(0.326)
Population: % New to area		-9.493**	Population: % New to area		0.948	-3.076**
		(3.096)			(0.762)	(0.913)
Population: % DegreeQual		0.371	Population: % DegreeQual		-0.459	0.0409
		(2.148)			(0.474)	(0.371)
log of lagged exits		0.117	% non-Akld Emp		-1.327	1.34
		(0.155)			(0.768)	(1.347)
ln(lag own ind exits)		0.348*	Only in Auckland		-0.0173	-0.0425
		(0.141)			(0.0629)	(0.0728)
AU count	2,664	1,952	Observations	2,505	2,505	2,505
log likelihood	-1138	-1037	* distinct firms			612
Negbin Dispersion (log)	-0.676*	-1.990**	R-squared	0.976	0.977	0.774
	(0.318)	(0.664)	RTS	1.065**	1.065**	0.951
Negbin Dispersion	0.509	0.137	RTSse	(0.010)	(0.009)	(0.027)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

INDUSTRY:	*Location Choice Regressions*			*Production Function Regressions*		
C22_TextileMfrg	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	0.006	-0.095	log(Intermed)	0.590**	0.584**	0.559**
	(0.076)	(0.094)		(0.0168)	(0.0159)	(0.0182)
Log of land price within 5km	0.035	0.408	log (Capital)	0.131**	0.129**	0.138**
	(0.095)	(0.262)		(0.0144)	(0.0146)	(0.0125)
log of AU employment	0.852**	0.642**	log(Emplt)	0.339**	0.352**	0.289**
	(0.050)	(0.092)		(0.0210)	(0.0218)	(0.0204)
CBD indicator		-0.597	CBD indicator		-0.0799	-0.0111
		(0.526)			(0.111)	(0.118)
Near Supermarket (§)		0.078	Near Supermarket (§)		0.0262	0.00794
		(0.093)			(0.0300)	(0.0360)
Near Motorway ramp (§)		-0.195*	Near Motorway ramp (§)		0.0325	0.0112
		(0.089)			(0.0252)	(0.0268)
Near Railway Station (§)		-0.024	Near Railway Station (§)		0.00168	-0.0214
		(0.087)			(0.0206)	(0.0358)
Near Bank (§)		-0.059	Near Bank (§)		-0.0378	-0.0664
		(0.090)			(0.0258)	(0.0358)
Near Airport (§)		-0.352	Near Airport (§)		-0.0502	-0.037
		(0.193)			(0.0681)	(0.0823)
Near CBD(§)		-0.318	Near CBD(§)		0.0112	0.0494
		(0.240)			(0.0569)	(0.0692)
Near Port (§)		0.317*	Near Port (§)		0.0376	-0.0544*
		(0.139)			(0.0281)	(0.0260)
Lagged log of empl within 5km		0.025	Log of empl within 5km		0.0424	0.125
		(0.266)			(0.0753)	(0.0848)
Lagged own emp share (5km)		24.493*	Own emp share (5km)		0.563	0.608
		(9.738)			(2.873)	(2.144)
Lagged input ind share (5km)		-1.547	Input ind share (5km)		-1.216	0.437
		(3.199)			(0.851)	(0.821)
Lagged output ind share (5km)		-1.611	Output ind share (5km)		0.184	-0.526
		(2.808)			(0.652)	(0.624)
Lagged industrial diversity		0.546	Industrial diversity		0.00332	0.0333
		(0.588)			(0.152)	(0.121)
AU Emp Density §§		0.260*				
		(0.124)				
Emp density within 5km §§		-0.711	Emp density within 5km §§		-0.0574	0.0928
		(0.406)			(0.121)	(0.139)
ln Population Density (5km)		0.172	ln Population Density (5km)		-0.0646	-0.0518
		(0.372)			(0.0941)	(0.0939)
Population: % Migrant		-1.835	Population: % Migrant		0.746*	-0.468
		(1.305)			(0.364)	(0.440)
Population: % New to area		-0.809	Population: % New to area		-0.623	-0.979
		(2.542)			(0.648)	(0.585)
Population: % DegreeQual		-2.596	Population: % DegreeQual		0.295	-0.577
		(2.207)			(0.397)	(0.387)
log of lagged exits		0.372**	% non-Akld Emp		0.24	1.064
		(0.118)			(0.808)	(0.953)
ln(lag own ind exits)		-0.005	Only in Auckland		0.129**	0.0253
		(0.109)			(0.0429)	(0.0577)
AU count	2,664	2,424	Observations	5,073	5,073	5,073
log likelihood	-1353	-1292	* distinct firms			1,191
Negbin Dispersion (log)	-1.010**	-2.051**	R-squared	0.932	0.934	0.682
	(0.320)	(0.695)	RTS	1.06**	1.065**	0.986
Negbin Dispersion	0.364	0.129	RTSse	(0.008)	(0.008)	(0.019)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

INDUSTRY:	*Location Choice Regressions*			*Production Function Regressions*	
C23_PaperMfrg	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	-0.487**	-0.426**	log(Intermed)	0.699**	0.698**	0.637**
	(0.120)	(0.124)		(0.0335)	(0.0354)	(0.0297)
Log of land price within 5km	-0.04	0.41	log (Capital)	0.0753**	0.0721**	0.130**
	(0.127)	(0.226)		(0.0258)	(0.0249)	(0.0167)
log of AU employment	1.114**	0.952**	log(Emplt)	0.261**	0.265**	0.230**
	(0.067)	(0.139)		(0.0345)	(0.0414)	(0.0301)
CBD indicator		-0.066	CBD indicator		0.332	-0.118
		(0.498)			(0.211)	(0.250)
Near Supermarket (§)		-0.046	Near Supermarket (§)		-0.0459	-0.237*
		(0.143)			(0.0356)	(0.0954)
Near Motorway ramp (§)		-0.333**	Near Motorway ramp (§)		-0.00637	-0.133*
		(0.099)			(0.0239)	(0.0575)
Near Railway Station (§)		0.262**	Near Railway Station (§)		0.00387	0.0217
		(0.091)			(0.0216)	(0.0471)
Near Bank (§)		-0.14	Near Bank (§)		0.0371	0.173**
		(0.138)			(0.0232)	(0.0651)
Near Airport (§)		-1.288**	Near Airport (§)		-0.151**	-0.317**
		(0.247)			(0.0548)	(0.104)
Near CBD(§)		-0.787**	Near CBD(§)		-0.108	0.190*
		(0.258)			(0.0898)	(0.0965)
Near Port (§)		0.162	Near Port (§)		0.0333	0.0209
		(0.107)			(0.0233)	(0.0148)
Lagged log of empl within 5km		0.326	Log of empl within 5km		0.153*	-0.052
		(0.254)			(0.0669)	(0.0791)
Lagged own emp share (5km)		16.492	Own emp share (5km)		-2.167	1.058
		(14.407)			(2.909)	(2.827)
Lagged input ind share (5km)		-0.064	Input ind share (5km)		-0.557	-0.0354
		(2.375)			(0.617)	(0.753)
Lagged output ind share (5km)		-1.735	Output ind share (5km)		1.476	0.294
		(8.750)			(1.881)	(2.046)
Lagged industrial diversity		-0.587	Industrial diversity		0.12	0.0809
		(0.654)			(0.161)	(0.117)
AU Emp Density §§		0.058				
		(0.142)				
Emp density within 5km §§		-1.015*	Emp density within 5km §§		0.115	-0.227*
		(0.450)			(0.102)	(0.109)
ln Population Density (5km)		0.293	ln Population Density (5km)		-0.0962	0.076
		(0.307)			(0.0589)	(0.0794)
Population: % Migrant		-1.449	Population: % Migrant		0.0156	0.686
		(1.400)			(0.260)	(0.485)
Population: % New to area		-7.604**	Population: % New to area		-0.9	-0.67
		(2.869)			(0.639)	(0.476)
Population: % DegreeQual		0.515	Population: % DegreeQual		-0.114	-1.542*
		(2.364)			(0.452)	(0.605)
log of lagged exits		0.223	% non-Akld Emp		1.345	1.416
		(0.160)			(0.729)	(0.902)
ln(lag own ind exits)		0.185	Only in Auckland		-0.0711	0.0325
		(0.200)			(0.0658)	(0.0538)
AU count	2,664	1,984	Observations	3,021	3,021	3,021
log likelihood	-861	-768	* distinct firms			684
Negbin Dispersion (log)	-0.399	-3.154	R-squared	0.966	0.966	0.786
	(0.370)	(1.691)	RTS	1.035**	1.035**	0.997
Negbin Dispersion	0.671	0.043	RTSse	(0.008)	(0.011)	(0.027)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

INDUSTRY:	*Location Choice Regressions*			*Production Function Regressions*	
C24_PrintMfrg	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	0.088	-0.081	log(Intermed)	0.694**	0.691**	0.608**
	(0.085)	(0.114)		(0.0153)	(0.0145)	(0.0210)
Log of land price within 5km	0.235*	-0.538*	log (Capital)	0.119**	0.114**	0.143**
	(0.106)	(0.238)		(0.0128)	(0.0120)	(0.0136)
log of AU employment	1.004**	0.585**	log(Emplt)	0.231**	0.244**	0.214**
	(0.064)	(0.102)		(0.0174)	(0.0174)	(0.0211)
CBD indicator		-0.951**	CBD indicator		-0.152	0.297
		(0.354)			(0.0798)	(0.191)
Near Supermarket (§)		-0.06	Near Supermarket (§)		0.00597	0.0214
		(0.107)			(0.0201)	(0.0337)
Near Motorway ramp (§)		0.015	Near Motorway ramp (§)		0.00752	-0.0262
		(0.083)			(0.0184)	(0.0325)
Near Railway Station (§)		-0.113	Near Railway Station (§)		-0.000703	-0.0596
		(0.090)			(0.0203)	(0.0350)
Near Bank (§)		-0.178	Near Bank (§)		0.00801	-0.028
		(0.092)			(0.0156)	(0.0278)
Near Airport (§)		-0.655**	Near Airport (§)		-0.0216	-0.283**
		(0.218)			(0.0506)	(0.0946)
Near CBD(§)		0.127	Near CBD(§)		0.0219	-0.00262
		(0.207)			(0.0458)	(0.0664)
Near Port (§)		-0.046	Near Port (§)		0.0241	0.0218
		(0.115)			(0.0187)	(0.0210)
Lagged log of empl within 5km		0.498*	Log of empl within 5km		-0.0262	-0.0326
		(0.243)			(0.0574)	(0.0896)
Lagged own emp share (5km)		-7.221	Own emp share (5km)		5.154	-2.014
		(10.774)			(3.061)	(2.444)
Lagged input ind share (5km)		-0.388	Input ind share (5km)		-0.0768	0.743
		(2.071)			(0.490)	(0.733)
Lagged output ind share (5km)		0.799	Output ind share (5km)		0.0787	-0.878
		(1.814)			(0.411)	(0.490)
Lagged industrial diversity		-0.454	Industrial diversity		-0.0587	-0.17
		(0.508)			(0.128)	(0.129)
AU Emp Density §§		-0.001				
		(0.150)				
Emp density within 5km §§		0.282	Emp density within 5km §§		-0.0369	-0.320*
		(0.326)			(0.0755)	(0.162)
ln Population Density (5km)		0.581	ln Population Density (5km)		-0.0715	0.296*
		(0.306)			(0.0597)	(0.120)
Population: % Migrant		-0.585	Population: % Migrant		0.507	0.291
		(1.414)			(0.274)	(0.416)
Population: % New to area		0.013	Population: % New to area		0.198	0.107
		(2.327)			(0.633)	(0.703)
Population: % DegreeQual		1.024	Population: % DegreeQual		0.402	-0.511
		(2.098)			(0.420)	(0.451)
log of lagged exits		0.557**	% non-Akld Emp		-0.781	3.610**
		(0.140)			(0.712)	(1.125)
ln(lag own ind exits)		0.146	Only in Auckland		0.132*	0.0146
		(0.097)			(0.0626)	(0.0597)
AU count	2,664	2,320	Observations	5,352	5,352	5,352
log likelihood	-1414	-1327	* distinct firms			1,353
Negbin Dispersion (log)	-1.108**	-3.118**	R-squared	0.939	0.94	0.684
	(0.309)	(0.988)	RTS	1.044**	1.05**	0.965
Negbin Dispersion	0.33	0.044	RTSse	(0.007)	(0.008)	(0.021)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

INDUSTRY:	*Location Choice Regressions*			*Production Function Regressions*		
C25_Petrochem	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	-0.434**	-0.341**	log(Intermed)	0.677**	0.673**	0.551**
	(0.092)	(0.116)		(0.0284)	(0.0276)	(0.0296)
Log of land price within 5km	0.099	0.620*	log (Capital)	0.151**	0.155**	0.156**
	(0.109)	(0.247)		(0.0181)	(0.0165)	(0.0185)
log of AU employment	1.110**	0.976**	log(Emplt)	0.197**	0.192**	0.270**
	(0.087)	(0.130)		(0.0278)	(0.0257)	(0.0226)
CBD indicator		-0.12	CBD indicator		0.00475	0.460
		(0.457)			(0.155)	(0.261)
Near Supermarket (§)		-0.03	Near Supermarket (§)		0.0744**	0.0113
		(0.118)			(0.0286)	(0.0444)
Near Motorway ramp (§)		-0.186*	Near Motorway ramp (§)		-0.0145	0.149**
		(0.094)			(0.0251)	(0.0428)
Near Railway Station (§)		0.038	Near Railway Station (§)		-0.0503*	-0.0418
		(0.103)			(0.0196)	(0.0434)
Near Bank (§)		-0.332**	Near Bank (§)		-0.047	0.0295
		(0.090)			(0.0314)	(0.0470)
Near Airport (§)		-0.469	Near Airport (§)		0.0145	0.108
		(0.271)			(0.0487)	(0.0969)
Near CBD(§)		-0.373	Near CBD(§)		-0.0506	-0.12
		(0.238)			(0.0637)	(0.0869)
Near Port (§)		0.209	Near Port (§)		-0.017	-0.0272
		(0.109)			(0.0214)	(0.0185)
Lagged log of empl within 5km		-0.191	Log of empl within 5km		0.138	0.0177
		(0.278)			(0.0788)	(0.0898)
Lagged own emp share (5km)		18.499**	Own emp share (5km)		-0.24	-0.895
		(6.982)			(1.391)	(1.673)
Lagged input ind share (5km)		0.493	Input ind share (5km)		-0.847	1.011
		(1.706)			(0.471)	(0.521)
Lagged output ind share (5km)		-0.109	Output ind share (5km)		0.0291	-0.364
		(1.137)			(0.335)	(0.306)
Lagged industrial diversity		-0.242	Industrial diversity		-0.0768	0.348*
		(0.615)			(0.149)	(0.150)
AU Emp Density §§		0.300*				
		(0.128)				
Emp density within 5km §§		-0.847*	Emp density within 5km §§		0.118	0.106
		(0.428)			(0.0884)	(0.136)
ln Population Density (5km)		-0.226	ln Population Density (5km)		0.0494	-0.0518
		(0.348)			(0.0707)	(0.0700)
Population: % Migrant		1.461	Population: % Migrant		-0.163	0.0555
		(1.384)			(0.285)	(0.488)
Population: % New to area		-2.689	Population: % New to area		0.0431	-1.029
		(3.231)			(0.604)	(0.615)
Population: % DegreeQual		-1.169	Population: % DegreeQual		-0.0324	-0.434
		(2.421)			(0.349)	(0.476)
log of lagged exits		0.221	% non-Akld Emp		1.324	0.208
		(0.162)			(0.789)	(1.104)
ln(lag own ind exits)		0.137	Only in Auckland		-0.0493	-0.0252
		(0.101)			(0.0328)	(0.0290)
AU count	2,664	1,744	Observations	3,168	3,168	3,168
log likelihood	-908	-804	* distinct firms			660
Negbin Dispersion (log)	-0.479*	-3.100*	R-squared	0.973	0.974	0.731
	(0.239)	(1.455)	RTS	1.025**	1.02**	0.978
Negbin Dispersion	0.619	0.045	RTSse	(0.007)	(0.008)	(0.024)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

INDUSTRY:	*Location Choice Regressions*			*Production Function Regressions*		
C27_MetalMfrg	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	-0.369**	-0.158	log(Intermed)	0.591**	0.591**	0.581**
	(0.104)	(0.126)		(0.0149)	(0.0140)	(0.0157)
Log of land price within 5km	-0.258*	0.193	log (Capital)	0.0979**	0.0969**	0.143**
	(0.123)	(0.329)		(0.0132)	(0.0119)	(0.0137)
log of AU employment	1.176**	0.864**	log(Emplt)	0.346**	0.349**	0.268**
	(0.081)	(0.127)		(0.0186)	(0.0176)	(0.0158)
CBD indicator		-0.486	CBD indicator		-0.055	0.0517
		(0.828)			(0.127)	(0.162)
Near Supermarket (§)		-0.087	Near Supermarket (§)		-0.0144	0.0105
		(0.115)			(0.0238)	(0.0345)
Near Motorway ramp (§)		-0.027	Near Motorway ramp (§)		-0.00363	0.0323
		(0.143)			(0.0172)	(0.0232)
Near Railway Station (§)		0.099	Near Railway Station (§)		-0.0274	-0.0155
		(0.122)			(0.0153)	(0.0183)
Near Bank (§)		-0.365	Near Bank (§)		-0.0283	0.0426*
		(0.201)			(0.0187)	(0.0216)
Near Airport (§)		-0.51	Near Airport (§)		0.0266	0.0779
		(0.317)			(0.0374)	(0.0827)
Near CBD(§)		-0.655*	Near CBD(§)		0.0525	0.0317
		(0.284)			(0.0590)	(0.0702)
Near Port (§)		0.055	Near Port (§)		0.0366	0.0191
		(0.113)			(0.0200)	(0.0120)
Lagged log of empl within 5km		-0.233	Log of empl within 5km		-0.0875	-0.114
		(0.332)			(0.0622)	(0.0676)
Lagged own emp share (5km)		17.724*	Own emp share (5km)		-2.908	-0.841
		(7.356)			(1.611)	(1.372)
Lagged input ind share (5km)		-0.6	Input ind share (5km)		0.18	-0.28
		(2.299)			(0.449)	(0.368)
Lagged output ind share (5km)		-0.194	Output ind share (5km)		-0.149	0.0662
		(1.145)			(0.261)	(0.228)
Lagged industrial diversity		0.088	Industrial diversity		0.116	0.167
		(0.738)			(0.0954)	(0.105)
AU Emp Density §§		0.121				
		(0.185)				
Emp density within 5km §§		-1.185**	Emp density within 5km §§		-0.147	-0.033
		(0.374)			(0.0777)	(0.0904)
ln Population Density (5km)		0.332	ln Population Density (5km)		0.0972	0.0132
		(0.463)			(0.0536)	(0.0609)
Population: % Migrant		-0.038	Population: % Migrant		-0.0058	0.272
		(1.596)			(0.236)	(0.265)
Population: % New to area		-2.996	Population: % New to area		0.42	1.573**
		(2.835)			(0.491)	(0.452)
Population: % DegreeQual		0.316	Population: % DegreeQual		-0.145	0.0783
		(2.169)			(0.318)	(0.311)
log of lagged exits		0.439**	% non-Akld Emp		0.234	-1.014
		(0.156)			(0.589)	(0.825)
ln(lag own ind exits)		0.153	Only in Auckland		-0.0526	0.0134
		(0.140)			(0.0365)	(0.0258)
AU count	2,664	2,440	Observations	6,585	6,585	6,585
log likelihood	-1194	-1078	* distinct firms			1,452
Negbin Dispersion (log)	-0.15	-2.235	R-squared	0.955	0.955	0.738
	(0.255)	(1.285)	RTS	1.035**	1.037**	0.992
Negbin Dispersion	0.861	0.107	RTSse	(0.006)	(0.007)	(0.014)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

INDUSTRY:	*Location Choice Regressions*			*Production Function Regressions*		
C28_EquipMfrg	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	-0.285**	-0.148	log(Intermed)	0.591**	0.585**	0.565**
	(0.078)	(0.086)		(0.0121)	(0.0117)	(0.0141)
Log of land price within 5km	-0.042	0.065	log (Capital)	0.0824**	0.0842**	0.127**
	(0.089)	(0.158)		(0.0114)	(0.00999)	(0.0111)
log of AU employment	0.974**	0.748**	log(Emplt)	0.363**	0.365**	0.306**
	(0.062)	(0.087)		(0.0173)	(0.0160)	(0.0165)
CBD indicator		0.165	CBD indicator		0.183*	-0.248*
		(0.574)			(0.0715)	(0.124)
Near Supermarket (§)		-0.065	Near Supermarket (§)		0.0201	0.0381
		(0.080)			(0.0185)	(0.0273)
Near Motorway ramp (§)		-0.128	Near Motorway ramp (§)		-0.00663	-0.000636
		(0.072)			(0.0147)	(0.0180)
Near Railway Station (§)		-0.15	Near Railway Station (§)		-0.0189	0.00953
		(0.081)			(0.0162)	(0.0184)
Near Bank (§)		-0.280**	Near Bank (§)		-0.0207	0.0072
		(0.072)			(0.0145)	(0.0226)
Near Airport (§)		-0.826**	Near Airport (§)		0.101**	0.00829
		(0.207)			(0.0309)	(0.0434)
Near CBD(§)		-0.085	Near CBD(§)		-0.0439	0.0314
		(0.223)			(0.0371)	(0.0463)
Near Port (§)		0.124	Near Port (§)		-0.0334*	-0.00749
		(0.109)			(0.0144)	(0.0148)
Lagged log of empl within 5km		-0.053	Log of empl within 5km		-0.00482	-0.0871
		(0.212)			(0.0417)	(0.0492)
Lagged own emp share (5km)		7.951*	Own emp share (5km)		-0.0623	-0.738
		(3.174)			(0.585)	(0.634)
Lagged input ind share (5km)		1.769	Input ind share (5km)		0.212	0.0182
		(1.493)			(0.255)	(0.269)
Lagged output ind share (5km)		0.418	Output ind share (5km)		-0.0266	0.327
		(1.215)			(0.246)	(0.256)
Lagged industrial diversity		-0.513	Industrial diversity		-0.102	0.0751
		(0.439)			(0.0844)	(0.0793)
AU Emp Density §§		-0.048				
		(0.108)				
Emp density within 5km §§		-0.523	Emp density within 5km §§		-0.107	-0.157*
		(0.271)			(0.0547)	(0.0782)
ln Population Density (5km)		0.794**	ln Population Density (5km)		0.0901*	0.0195
		(0.199)			(0.0382)	(0.0442)
Population: % Migrant		-2.803**	Population: % Migrant		-0.128	0.0603
		(0.992)			(0.229)	(0.231)
Population: % New to area		-2.377	Population: % New to area		0.0267	0.326
		(1.935)			(0.392)	(0.325)
Population: % DegreeQual		-3.541*	Population: % DegreeQual		0.314	0.197
		(1.485)			(0.243)	(0.275)
log of lagged exits		0.266*	% non-Akld Emp		0.779	-0.0473
		(0.110)			(0.483)	(0.465)
ln(lag own ind exits)		0.225**	Only in Auckland		0.0935*	0.05
		(0.073)			(0.0430)	(0.0385)
AU count	2,664	2,600	Observations	10,782	10,782	10,782
log likelihood	-1785	-1634	* distinct firms			2,478
Negbin Dispersion (log)	-0.849**	-3.404*	R-squared	0.933	0.934	0.664
	(0.277)	(1.424)	RTS	1.037**	1.035**	0.998
Negbin Dispersion	0.428	0.033	RTSse	(0.006)	(0.005)	(0.015)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

INDUSTRY:	*Location Choice Regressions*			*Production Function Regressions*	
C29_FurnMfrg	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	-0.301**	-0.191*	log(Intermed)	0.673**	0.673**	0.647**
	(0.080)	(0.094)		(0.0244)	(0.0197)	(0.0187)
Log of land price within 5km	0.071	0.726**	log (Capital)	0.108**	0.110**	0.126**
	(0.092)	(0.221)		(0.0140)	(0.0129)	(0.0107)
log of AU employment	0.925**	0.683**	log(Emplt)	0.280**	0.285**	0.275**
	(0.056)	(0.104)		(0.0260)	(0.0198)	(0.0183)
CBD indicator		-0.438	CBD indicator		0.0546	-0.0337
		(0.373)			(0.0952)	(0.175)
Near Supermarket (§)		-0.118	Near Supermarket (§)		0.00374	0.0214
		(0.099)			(0.0232)	(0.0281)
Near Motorway ramp (§)		-0.205**	Near Motorway ramp (§)		-0.0116	-0.0144
		(0.078)			(0.0161)	(0.0275)
Near Railway Station (§)		-0.114	Near Railway Station (§)		-0.0345	0.0209
		(0.085)			(0.0181)	(0.0298)
Near Bank (§)		-0.158	Near Bank (§)		-0.00225	-0.0143
		(0.091)			(0.0169)	(0.0285)
Near Airport (§)		-0.454*	Near Airport (§)		0.0122	-0.0744
		(0.208)			(0.0477)	(0.0654)
Near CBD(§)		-0.087	Near CBD(§)		0.00616	-0.0487
		(0.226)			(0.0532)	(0.0689)
Near Port (§)		0.033	Near Port (§)		-0.023	0.0310*
		(0.122)			(0.0195)	(0.0157)
Lagged log of empl within 5km		-0.204	Log of empl within 5km		0.0392	0.0711
		(0.332)			(0.0823)	(0.0981)
Lagged own emp share (5km)		17.474	Own emp share (5km)		-1.068	1.112
		(11.629)			(2.997)	(2.917)
Lagged input ind share (5km)		1.262	Input ind share (5km)		0.383	-0.168
		(1.595)			(0.338)	(0.329)
Lagged output ind share (5km)		-1.475	Output ind share (5km)		0.268	0.0201
		(2.190)			(0.400)	(0.594)
Lagged industrial diversity		0.577	Industrial diversity		0.117	0.0141
		(0.650)			(0.0992)	(0.0992)
AU Emp Density §§		0.118				
		(0.114)				
Emp density within 5km §§		-1.278**	Emp density within 5km §§		0.0117	0.0789
		(0.445)			(0.0810)	(0.135)
ln Population Density (5km)		0.028	ln Population Density (5km)		0.0567	-0.031
		(0.339)			(0.0544)	(0.0837)
Population: % Migrant		-1.855	Population: % Migrant		-0.301	-0.00331
		(0.979)			(0.260)	(0.391)
Population: % New to area		-4.211	Population: % New to area		-0.86	-0.134
		(2.816)			(0.635)	(0.608)
Population: % DegreeQual		-3.835*	Population: % DegreeQual		-0.0188	0.0883
		(1.925)			(0.380)	(0.372)
log of lagged exits		0.398**	% non-Akld Emp		1.166	0.675
		(0.127)			(0.720)	(0.862)
ln(lag own ind exits)		-0.018	Only in Auckland		0.127	0.133
		(0.103)			(0.0666)	(0.0898)
AU count	2,664	2,456	Observations	6,633	6,633	6,633
log likelihood	-1268	-1187	* distinct firms			1,536
Negbin Dispersion (log)	-0.903**	-2.602**	R-squared	0.929	0.93	0.717
	(0.318)	(0.772)	RTS	1.062**	1.067**	1.048**
Negbin Dispersion	0.405	0.074	RTSse	(0.010)	(0.010)	(0.016)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

INDUSTRY:	*Location Choice Regressions*			*Production Function Regressions*		
E_Construction	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	-0.012	0.153**	log(Intermed)	0.700**	0.698**	0.683**
	(0.042)	(0.037)		(0.00346)	(0.00341)	(0.00432)
Log of land price within 5km	-0.193**	-0.079	log (Capital)	0.0754**	0.0767**	0.0926**
	(0.049)	(0.075)		(0.00314)	(0.00319)	(0.00324)
log of AU employment	0.436**	0.177**	log(Emplt)	0.262**	0.264**	0.197**
	(0.030)	(0.038)		(0.00498)	(0.00468)	(0.00525)
CBD indicator		0.347*	CBD indicator		0.173**	0.141*
		(0.157)			(0.0483)	(0.0643)
Near Supermarket (§)		0.015	Near Supermarket (§)		0.00497	0.016
		(0.035)			(0.00688)	(0.0106)
Near Motorway ramp (§)		-0.011	Near Motorway ramp (§)		0.00331	-0.0162*
		(0.028)			(0.00458)	(0.00818)
Near Railway Station (§)		-0.016	Near Railway Station (§)		-0.0103	-0.00123
		(0.029)			(0.00621)	(0.00996)
Near Bank (§)		-0.152**	Near Bank (§)		-0.00405	0.00546
		(0.030)			(0.00584)	(0.00869)
Near Airport (§)		-0.349**	Near Airport (§)		0.00441	0.00682
		(0.078)			(0.0155)	(0.0268)
Near CBD(§)		-0.275**	Near CBD(§)		-0.0348*	-0.0780**
		(0.079)			(0.0135)	(0.0238)
Near Port (§)		0.027	Near Port (§)		0.0123	0.00963
		(0.047)			(0.00874)	(0.0103)
Lagged log of empl within 5km		0.03	Log of empl within 5km		-0.0109	0.023
		(0.085)			(0.0140)	(0.0222)
Lagged own emp share (5km)		1.822*	Own emp share (5km)		-0.21	-0.134
		(0.764)			(0.128)	(0.203)
Lagged input ind share (5km)		0.564	Input ind share (5km)		-0.0334	0.0131
		(0.447)			(0.0866)	(0.112)
Lagged output ind share (5km)		1.476	Output ind share (5km)		-0.159	-0.432
		(1.619)			(0.242)	(0.366)
Lagged industrial diversity		0.104	Industrial diversity		0.0166	0.0396
		(0.200)			(0.0288)	(0.0336)
AU Emp Density §§		-0.242**				
		(0.046)				
Emp density within 5km §§		-0.232	Emp density within 5km §§		-0.0108	0.011
		(0.120)			(0.0170)	(0.0310)
ln Population Density (5km)		0.296**	ln Population Density (5km)		0.0284*	0.0125
		(0.110)			(0.0135)	(0.0224)
Population: % Migrant		-0.017	Population: % Migrant		-0.139	-0.232
		(0.403)			(0.0716)	(0.132)
Population: % New to area		-0.986	Population: % New to area		-0.158	-0.195
		(0.751)			(0.114)	(0.165)
Population: % DegreeQual		-0.812	Population: % DegreeQual		0.380**	0.512**
		(0.687)			(0.102)	(0.152)
log of lagged exits		0.265**	% non-Akld Emp		0.131	0.489*
		(0.050)			(0.149)	(0.240)
ln(lag own ind exits)		0.191**	Only in Auckland		0.0349	0.0266
		(0.029)			(0.0269)	(0.0272)
AU count	2,664	2,664	Observations	65,127	65,127	65,127
log likelihood	-5353	-4971	* distinct firms			18,261
Negbin Dispersion (log)	-1.368**	-2.551**	R-squared	0.896	0.897	0.698
	(0.113)	(0.158)	RTS	1.038**	1.039**	0.973**
Negbin Dispersion	0.255	0.078	RTSse	(0.003)	(0.003)	(0.005)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

	Location Choice Regressions			*Production Function Regressions*		
INDUSTRY: F_Wholesale	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	-0.075	0.028	log(Intermed)	0.510**	0.508**	0.439**
	(0.042)	(0.037)		(0.00616)	(0.00567)	(0.00774)
Log of land price within 5km	0.130*	0.17	log (Capital)	0.193**	0.192**	0.163**
	(0.053)	(0.107)		(0.00789)	(0.00783)	(0.00638)
log of AU employment	1.031**	0.625**	log(Emplt)	0.347**	0.351**	0.315**
	(0.039)	(0.059)		(0.0110)	(0.0100)	(0.00977)
CBD indicator		-0.418*	CBD indicator		-0.108	-0.0537
		(0.170)			(0.0599)	(0.0692)
Near Supermarket (§)		-0.007	Near Supermarket (§)		-0.00571	0.0156
		(0.044)			(0.0162)	(0.0176)
Near Motorway ramp (§)		0.003	Near Motorway ramp (§)		0.0194	0.0019
		(0.037)			(0.0111)	(0.0136)
Near Railway Station (§)		-0.02	Near Railway Station (§)		0.00564	-0.00273
		(0.046)			(0.0124)	(0.0178)
Near Bank (§)		-0.132**	Near Bank (§)		0.0136	0.00534
		(0.039)			(0.0152)	(0.0150)
Near Airport (§)		-0.174	Near Airport (§)		0.0101	0.0193
		(0.118)			(0.0296)	(0.0318)
Near CBD(§)		-0.151	Near CBD(§)		0.0211	-0.00203
		(0.092)			(0.0275)	(0.0362)
Near Port (§)		0.119*	Near Port (§)		0.0245	-0.00261
		(0.053)			(0.0141)	(0.0127)
Lagged log of empl within 5km		-0.298**	Log of empl within 5km		-0.0658*	0.0136
		(0.099)			(0.0308)	(0.0394)
Lagged own emp share (5km)		4.400**	Own emp share (5km)		0.549	-0.249
		(1.556)			(0.586)	(0.498)
Lagged input ind share (5km)		-0.431	Input ind share (5km)		-0.211	0.0497
		(1.095)			(0.378)	(0.289)
Lagged output ind share (5km)		-0.622	Output ind share (5km)		-0.238	0.239
		(0.458)			(0.166)	(0.164)
Lagged industrial diversity		-0.505*	Industrial diversity		-0.197**	0.0184
		(0.216)			(0.0668)	(0.0618)
AU Emp Density §§		-0.086				
		(0.056)				
Emp density within 5km §§		-0.666**	Emp density within 5km §§		0.016	0.00484
		(0.170)			(0.0531)	(0.0609)
ln Population Density (5km)		0.345	ln Population Density (5km)		0.0349	-0.000932
		(0.177)			(0.0334)	(0.0432)
Population: % Migrant		0.008	Population: % Migrant		-0.093	-0.265
		(0.552)			(0.180)	(0.215)
Population: % New to area		1.107	Population: % New to area		0.142	-0.21
		(0.971)			(0.316)	(0.339)
Population: % DegreeQual		-0.303	Population: % DegreeQual		0.183	0.124
		(0.765)			(0.176)	(0.215)
log of lagged exits		0.334**	% non-Akld Emp		-1.145**	0.129
		(0.063)			(0.387)	(0.440)
ln(lag own ind exits)		0.247**	Only in Auckland		0.00608	0.0333
		(0.037)			(0.0285)	(0.0286)
AU count	2,664	2,664	Observations	36,921	36,921	36,921
log likelihood	-4030	-3798	* distinct firms			9,336
Negbin Dispersion (log)	-1.264**	-2.512**	R-squared	0.893	0.894	0.511
	(0.161)	(0.353)	RTS	1.051**	1.05**	0.917**
Negbin Dispersion	0.283	0.081	RTSse	(0.004)	(0.005)	(0.010)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

	Location Choice Regressions			*Production Function Regressions*		
INDUSTRY: G_Retail	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	0.154**	-0.005	log(Intermed)	0.410**	0.410**	0.387**
	(0.049)	(0.046)		(0.00474)	(0.00518)	(0.00680)
Log of land price within 5km	-0.140**	0.101	log (Capital)	0.209**	0.210**	0.255**
	(0.054)	(0.137)		(0.00550)	(0.00612)	(0.00679)
log of AU employment	0.876**	0.444**	log(Emplt)	0.464**	0.473**	0.365**
	(0.032)	(0.046)		(0.00678)	(0.00757)	(0.00796)
CBD indicator		0.077	CBD indicator		0.034	0.00664
		(0.197)			(0.0467)	(0.0724)
Near Supermarket (§)		0.245**	Near Supermarket (§)		-0.0360**	0.00243
		(0.048)			(0.0129)	(0.0176)
Near Motorway ramp (§)		-0.033	Near Motorway ramp (§)		0.0490**	0.0122
		(0.039)			(0.0103)	(0.0151)
Near Railway Station (§)		0.028	Near Railway Station (§)		0.0109	0.00911
		(0.039)			(0.0111)	(0.0159)
Near Bank (§)		0.176**	Near Bank (§)		-0.0126	-0.0103
		(0.045)			(0.0118)	(0.0156)
Near Airport (§)		-0.381**	Near Airport (§)		-0.0713*	0.0228
		(0.116)			(0.0305)	(0.0411)
Near CBD(§)		-0.266**	Near CBD(§)		-0.0719**	0.0189
		(0.097)			(0.0261)	(0.0333)
Near Port (§)		0.108	Near Port (§)		0.0439*	-0.00442
		(0.061)			(0.0177)	(0.0117)
Lagged log of empl within 5km		-0.087	Log of empl within 5km		-0.0365	-0.00339
		(0.124)			(0.0293)	(0.0396)
Lagged own emp share (5km)		-1.326	Own emp share (5km)		-0.575	-0.114
		(1.000)			(0.339)	(0.371)
Lagged input ind share (5km)		-0.575	Input ind share (5km)		-0.212	-0.0709
		(1.419)			(0.297)	(0.305)
Lagged output ind share (5km)		-0.022	Output ind share (5km)		-0.0907	0.24
		(1.374)			(0.254)	(0.262)
Lagged industrial diversity		-0.083	Industrial diversity		-0.167**	0.00709
		(0.296)			(0.0515)	(0.0451)
AU Emp Density §§		-0.068				
		(0.052)				
Emp density within 5km §§		-0.32	Emp density within 5km §§		-0.0634	-0.0281
		(0.173)			(0.0406)	(0.0563)
ln Population Density (5km)		0.114	ln Population Density (5km)		0.0768*	0.00691
		(0.165)			(0.0312)	(0.0426)
Population: % Migrant		1.06	Population: % Migrant		0.0378	-0.133
		(0.639)			(0.169)	(0.189)
Population: % New to area		0.76	Population: % New to area		-0.119	0.346
		(1.133)			(0.280)	(0.293)
Population: % DegreeQual		-0.548	Population: % DegreeQual		0.173	0.104
		(0.908)			(0.193)	(0.214)
log of lagged exits		0.222**	% non-Akld Emp		0.0471	0.0303
		(0.058)			(0.348)	(0.482)
ln(lag own ind exits)		0.222**	Only in Auckland		0.0878**	0.0870**
		(0.033)			(0.0306)	(0.0328)
AU count	2,664	2,664	Observations	60,426	60,426	60,426
log likelihood	-5571	-5203	* distinct firms			17,085
Negbin Dispersion (log)	-1.087**	-1.984**	R-squared	0.83	0.831	0.534
	(0.113)	(0.132)	RTS	1.083**	1.093**	1.008
Negbin Dispersion	0.337	0.137	RTSse	(0.003)	(0.004)	(0.008)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

	Location Choice Regressions			*Production Function Regressions*		
INDUSTRY: H_Accomm	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	0.273**	0.134*	log(Intermed)	0.621**	0.618**	0.563**
	(0.064)	(0.053)		(0.0154)	(0.0149)	(0.0162)
Log of land price within 5km	-0.046	-0.027	log (Capital)	0.159**	0.155**	0.197**
	(0.083)	(0.132)		(0.00880)	(0.0100)	(0.0120)
log of AU employment	0.786**	0.306**	log(Emplt)	0.288**	0.292**	0.274**
	(0.035)	(0.058)		(0.0119)	(0.0118)	(0.0117)
CBD indicator		-0.026	CBD indicator		0.0371	0.00663
		(0.204)			(0.0384)	(0.0887)
Near Supermarket (§)		0.260**	Near Supermarket (§)		0.00805	-0.0693**
		(0.056)			(0.0131)	(0.0232)
Near Motorway ramp (§)		-0.082	Near Motorway ramp (§)		0.0356**	0.0245
		(0.047)			(0.0118)	(0.0188)
Near Railway Station (§)		-0.024	Near Railway Station (§)		0.00896	-0.0211
		(0.044)			(0.0146)	(0.0232)
Near Bank (§)		0.229**	Near Bank (§)		-0.0079	0.0245
		(0.056)			(0.0103)	(0.0220)
Near Airport (§)		-0.189	Near Airport (§)		0.0302	-0.0326
		(0.124)			(0.0276)	(0.0719)
Near CBD(§)		0.109	Near CBD(§)		-0.0294	-0.0612
		(0.109)			(0.0226)	(0.0548)
Near Port (§)		0.062	Near Port (§)		0.0449**	0.025
		(0.067)			(0.0142)	(0.0187)
Lagged log of empl within 5km		-0.126	Log of empl within 5km		-0.0355	-0.0281
		(0.113)			(0.0258)	(0.0560)
Lagged own emp share (5km)		4.954	Own emp share (5km)		-1.23	0.0432
		(2.740)			(1.084)	(1.003)
Lagged input ind share (5km)		1.076	Input ind share (5km)		-0.357	-0.736
		(0.930)			(0.365)	(0.423)
Lagged output ind share (5km)		-0.449	Output ind share (5km)		0.0563	0.256
		(0.853)			(0.240)	(0.359)
Lagged industrial diversity		-0.165	Industrial diversity		-0.122	-0.0896
		(0.296)			(0.0986)	(0.0693)
AU Emp Density §§		-0.289**				
		(0.066)				
Emp density within 5km §§		-0.024	Emp density within 5km §§		-0.0437	-0.174*
		(0.166)			(0.0389)	(0.0844)
ln Population Density (5km)		0	ln Population Density (5km)		-0.00857	0.149*
		(0.166)			(0.0427)	(0.0656)
Population: % Migrant		0.072	Population: % Migrant		0.103	-0.577*
		(0.673)			(0.210)	(0.292)
Population: % New to area		3.465**	Population: % New to area		-0.356	-0.458
		(1.192)			(0.321)	(0.505)
Population: % DegreeQual		0.248	Population: % DegreeQual		0.435*	0.0993
		(0.988)			(0.221)	(0.380)
log of lagged exits		0.316**	% non-Akld Emp		-0.759	1.049
		(0.074)			(0.523)	(0.682)
ln(lag own ind exits)		0.147**	Only in Auckland		-0.00303	-0.175
		(0.042)			(0.0858)	(0.0918)
AU count	2,664	2,648	Observations	13,659	13,659	13,659
log likelihood	-3676	-3407	* distinct firms			4,452
Negbin Dispersion (log)	-1.088**	-2.754**	R-squared	0.908	0.908	0.804
	(0.134)	(0.325)	RTS	1.068**	1.064**	1.034**
Negbin Dispersion	0.337	0.064	RTSse	(0.005)	(0.006)	(0.010)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

	Location Choice Regressions			*Production Function Regressions*		
INDUSTRY: I_Transport	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	0.03	0.145*	log(Intermed)	0.710**	0.697**	0.615**
	(0.077)	(0.059)		(0.00664)	(0.00641)	(0.00996)
Log of land price within 5km	-0.245**	-0.109	log (Capital)	0.119**	0.123**	0.144**
	(0.070)	(0.152)		(0.00693)	(0.00736)	(0.00557)
log of AU employment	0.804**	0.294**	log(Emplt)	0.251**	0.259**	0.238**
	(0.051)	(0.059)		(0.0103)	(0.0100)	(0.0108)
CBD indicator		0.855*	CBD indicator		0.0634	0.0277
		(0.376)			(0.0646)	(0.0769)
Near Supermarket (§)		-0.035	Near Supermarket (§)		-0.0499**	0.00997
		(0.060)			(0.0142)	(0.0184)
Near Motorway ramp (§)		-0.04	Near Motorway ramp (§)		-0.00445	-0.0176
		(0.050)			(0.0112)	(0.0136)
Near Railway Station (§)		-0.082	Near Railway Station (§)		-0.00799	0.0142
		(0.062)			(0.0120)	(0.0169)
Near Bank (§)		-0.058	Near Bank (§)		0.0510**	-0.00377
		(0.061)			(0.0117)	(0.0163)
Near Airport (§)		0.256	Near Airport (§)		-0.0738*	-0.0108
		(0.178)			(0.0294)	(0.0369)
Near CBD(§)		-0.079	Near CBD(§)		-0.0799**	-0.0375
		(0.131)			(0.0281)	(0.0361)
Near Port (§)		0.117	Near Port (§)		0.0502**	0.00439
		(0.072)			(0.0172)	(0.0126)
Lagged log of empl within 5km		0.071	Log of empl within 5km		-0.00563	0.0365
		(0.120)			(0.0264)	(0.0357)
Lagged own emp share (5km)		1.047	Own emp share (5km)		0.502	-0.0614
		(1.447)			(0.352)	(0.263)
Lagged input ind share (5km)		2.781**	Input ind share (5km)		0.651**	0.165
		(0.981)			(0.221)	(0.218)
Lagged output ind share (5km)		1.121	Output ind share (5km)		0.305*	0.071
		(0.617)			(0.147)	(0.152)
Lagged industrial diversity		0.702*	Industrial diversity		0.0612	0.0285
		(0.317)			(0.0606)	(0.0496)
AU Emp Density §§		-0.277**				
		(0.072)				
Emp density within 5km §§		-0.008	Emp density within 5km §§		0.0395	0.0961
		(0.186)			(0.0401)	(0.0548)
ln Population Density (5km)		0.101	ln Population Density (5km)		0.0470	-0.0529
		(0.193)			(0.0264)	(0.0432)
Population: % Migrant		-1.309*	Population: % Migrant		-0.353*	0.141
		(0.646)			(0.148)	(0.200)
Population: % New to area		0.86	Population: % New to area		0.338	-0.276
		(1.227)			(0.292)	(0.306)
Population: % DegreeQual		-2.218*	Population: % DegreeQual		0.0537	0.380
		(1.090)			(0.195)	(0.209)
log of lagged exits		0.356**	% non-Akld Emp		0.45	-0.188
		(0.072)			(0.314)	(0.457)
ln(lag own ind exits)		0.199**	Only in Auckland		0.0556	0.0126
		(0.058)			(0.0389)	(0.0352)
AU count	2,664	2,664	Observations	19,950	19,950	19,950
log likelihood	-3016	-2839	* distinct firms			5,502
Negbin Dispersion (log)	-0.834**	-2.421**	R-squared	0.934	0.935	0.716
	(0.165)	(0.492)	RTS	1.08**	1.079**	0.997
Negbin Dispersion	0.434	0.089	RTSse	(0.005)	(0.006)	(0.010)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

	Location Choice Regressions			*Production Function Regressions*		
INDUSTRY: J_Commun	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	0.225**	0.071	log(Intermed)	0.627**	0.626**	0.635**
	(0.084)	(0.098)		(0.0193)	(0.0187)	(0.0231)
Log of land price within 5km	-0.207*	-0.317	log (Capital)	0.126**	0.130**	0.180**
	(0.091)	(0.265)		(0.0136)	(0.0124)	(0.0120)
log of AU employment	0.631**	0.063	log(Emplt)	0.275**	0.289**	0.245**
	(0.055)	(0.097)		(0.0198)	(0.0170)	(0.0253)
CBD indicator		-0.236	CBD indicator		-0.0462	-0.148
		(0.381)			(0.134)	(0.190)
Near Supermarket (§)		0.023	Near Supermarket (§)		-0.0236	-0.0307
		(0.096)			(0.0208)	(0.0311)
Near Motorway ramp (§)		0.034	Near Motorway ramp (§)		-0.0157	-0.0124
		(0.082)			(0.0168)	(0.0271)
Near Railway Station (§)		-0.094	Near Railway Station (§)		0.00565	-0.0271
		(0.092)			(0.0169)	(0.0262)
Near Bank (§)		-0.192*	Near Bank (§)		0.00942	0.0058
		(0.092)			(0.0190)	(0.0256)
Near Airport (§)		0.616**	Near Airport (§)		0.026	-0.0615
		(0.219)			(0.0474)	(0.0645)
Near CBD(§)		0.438**	Near CBD(§)		0.00362	0.0331
		(0.162)			(0.0526)	(0.0783)
Near Port (§)		0.138	Near Port (§)		-0.000729	0.0656**
		(0.128)			(0.0210)	(0.0253)
Lagged log of empl within 5km		-0.043	Log of empl within 5km		0.0237	-0.0221
		(0.234)			(0.0481)	(0.0807)
Lagged own emp share (5km)		6.732	Own emp share (5km)		0.403	0.775
		(4.036)			(1.523)	(0.966)
Lagged input ind share (5km)		-8.410**	Input ind share (5km)		-0.0797	-0.336
		(2.555)			(1.045)	(0.723)
Lagged output ind share (5km)		2.842*	Output ind share (5km)		0.238	0.0224
		(1.422)			(0.444)	(0.491)
Lagged industrial diversity		-0.437	Industrial diversity		-0.00678	-0.0416
		(0.520)			(0.0715)	(0.0957)
AU Emp Density §§		0.099				
		(0.104)				
Emp density within 5km §§		0.105	Emp density within 5km §§		0.0775	0.0279
		(0.303)			(0.0726)	(0.0960)
ln Population Density (5km)		-0.112	ln Population Density (5km)		-0.00206	0.0874
		(0.276)			(0.0583)	(0.0774)
Population: % Migrant		-0.275	Population: % Migrant		-0.0271	-0.42
		(1.297)			(0.286)	(0.402)
Population: % New to area		4.764*	Population: % New to area		0.512	-0.942
		(2.236)			(1.289)	(0.713)
Population: % DegreeQual		1.261	Population: % DegreeQual		-0.42	-0.0453
		(1.898)			(0.290)	(0.450)
log of lagged exits		0.652**	% non-Akld Emp		-0.274	0.015
		(0.119)			(0.841)	(0.970)
ln(lag own ind exits)		0.244*	Only in Auckland		0.15	-0.00046
		(0.117)			(0.117)	(0.0965)
AU count	2,664	2,624	Observations	5,574	5,574	5,574
log likelihood	-1404	-1347	* distinct firms			1,950
Negbin Dispersion (log)	-0.815*	-1.824**	R-squared	0.918	0.919	0.682
	(0.322)	(0.687)	RTS	1.028**	1.045**	1.06*
Negbin Dispersion	0.443	0.161	RTSse	(0.008)	(0.011)	(0.027)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

	Location Choice Regressions			*Production Function Regressions*		
INDUSTRY: K73_Finance	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	0.351**	0.267*	log(Intermed)	0.584**	0.582**	0.391**
	(0.064)	(0.110)		(0.0270)	(0.0248)	(0.0337)
Log of land price within 5km	-0.067	0.519*	log (Capital)	0.0903**	0.0809**	0.141**
	(0.087)	(0.246)		(0.0282)	(0.0273)	(0.0288)
log of AU employment	1.018**	0.444**	log(Emplt)	0.357**	0.353**	0.255**
	(0.046)	(0.118)		(0.0323)	(0.0306)	(0.0528)
CBD indicator		0.33	CBD indicator		0.506	0.0504
		(0.281)			(0.307)	(0.334)
Near Supermarket (§)		0.104	Near Supermarket (§)		-0.0547	0.146
		(0.088)			(0.0752)	(0.110)
Near Motorway ramp (§)		0.07	Near Motorway ramp (§)		0.105*	0.0181
		(0.085)			(0.0502)	(0.0992)
Near Railway Station (§)		0.272**	Near Railway Station (§)		0.118	0.0747
		(0.078)			(0.0816)	(0.0946)
Near Bank (§)		0.287**	Near Bank (§)		-0.0269	0.0156
		(0.092)			(0.0552)	(0.0955)
Near Airport (§)		-0.072	Near Airport (§)		0.00202	-0.397
		(0.226)			(0.153)	(0.357)
Near CBD(§)		-0.313	Near CBD(§)		-0.385*	-0.157
		(0.219)			(0.183)	(0.183)
Near Port (§)		0.191*	Near Port (§)		0.0155	0.125
		(0.093)			(0.0792)	(0.0730)
Lagged log of empl within 5km		-0.295	Log of empl within 5km		0.283	0.0312
		(0.227)			(0.213)	(0.274)
Lagged own emp share (5km)		-3.442	Own emp share (5km)		3.603	15.82
		(11.356)			(8.630)	(8.978)
Lagged input ind share (5km)		1.75	Input ind share (5km)		0.834	-0.689
		(3.260)			(2.246)	(3.318)
Lagged output ind share (5km)		-1.074	Output ind share (5km)		-0.977	0.613
		(2.285)			(1.625)	(2.653)
Lagged industrial diversity		0.107	Industrial diversity		0.219	0.0892
		(0.701)			(0.338)	(0.245)
AU Emp Density §§		-0.194				
		(0.115)				
Emp density within 5km §§		0.062	Emp density within 5km §§		0.426	0.253
		(0.287)			(0.242)	(0.528)
ln Population Density (5km)		-0.655*	ln Population Density (5km)		-0.328	-0.0709
		(0.281)			(0.235)	(0.463)
Population: % Migrant		2.193	Population: % Migrant		1.476	2.511
		(1.291)			(0.967)	(2.182)
Population: % New to area		0.3	Population: % New to area		1.207	-0.385
		(3.082)			(1.977)	(2.834)
Population: % DegreeQual		0.432	Population: % DegreeQual		1.786	0.281
		(2.157)			(1.104)	(1.919)
log of lagged exits		0.442**	% non-Akld Emp		0.17	0.325
		(0.151)			(1.884)	(4.032)
ln(lag own ind exits)		0.084	Only in Auckland		-0.0187	0.0892
		(0.076)			(0.172)	(0.137)
AU count	2,664	2,168	Observations	2,082	2,082	2,082
log likelihood	-1396	-1303	* distinct firms			672
Negbin Dispersion (log)	-1.771**	-4.949	R-squared	0.836	0.841	0.39
	(0.390)	(6.885)	RTS	1.031	1.017	0.787**
Negbin Dispersion	0.17	0.007	RTSse	(0.016)	(0.020)	(0.052)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

INDUSTRY:	*Location Choice Regressions*		*Production Function Regressions*
K74K75_InsFinServ	*Negbin IV*	*Negbin IV*	
Log of Land Price per hectare	0.410**	0.216**	
	(0.078)	(0.068)	
Log of land price within 5km	0.036	-0.005	
	(0.087)	(0.207)	(not part of the measured sector)
log of AU employment	0.883**	0.142	
	(0.052)	(0.084)	
CBD indicator		0.505**	
		(0.188)	
Near Supermarket (§)		0.017	
		(0.086)	
Near Motorway ramp (§)		0.136*	
		(0.069)	
Near Railway Station (§)		-0.122	
		(0.082)	
Near Bank (§)		0.143	
		(0.093)	
Near Airport (§)		-0.178	
		(0.203)	
Near CBD(§)		-0.01	
		(0.143)	
Near Port (§)		-0.054	
		(0.095)	
Lagged log of empl within 5km		0.204	
		(0.192)	
Lagged own emp share (5km)		7.418	
		(7.671)	
Lagged input ind share (5km)		-3.849**	
		(1.282)	
Lagged output ind share (5km)		-0.601	
		(0.483)	
Lagged industrial diversity		-0.364	
		(0.539)	
AU Emp Density §§		-0.272**	
		(0.097)	
Emp density within 5km §§		0.158	
		(0.323)	
ln Population Density (5km)		-0.2	
		(0.291)	
Population: % Migrant		1.588	
		(1.116)	
Population: % New to area		-0.355	
		(2.299)	
Population: % DegreeQual		3.229	
		(1.679)	
log of lagged exits		0.585**	
		(0.104)	
ln(lag own ind exits)		0.208**	
		(0.079)	
AU count	2,664	2,432	
log likelihood	-1929	-1801	
Negbin Dispersion (log)	-0.874**	-2.163**	
	(0.267)	(0.641)	
Negbin Dispersion	0.417	0.115	

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

INDUSTRY:	*Location Choice Regressions*		*Production Function Regressions*
L77_PropEquipHire	*Negbin IV*	*Negbin IV*	
Log of Land Price per hectare	0.199**	0.198**	
	(0.047)	(0.052)	
Log of land price within 5km	-0.01	-0.245*	
	(0.061)	(0.118)	(not part of the measured sector)
log of AU employment	0.691**	0.167**	
	(0.030)	(0.053)	
CBD indicator		-0.147	
		(0.179)	
Near Supermarket (§)		-0.001	
		(0.055)	
Near Motorway ramp (§)		-0.006	
		(0.042)	
Near Railway Station (§)		-0.099*	
		(0.048)	
Near Bank (§)		0.129*	
		(0.059)	
Near Airport (§)		-0.076	
		(0.102)	
Near CBD(§)		0.129	
		(0.096)	
Near Port (§)		0.131*	
		(0.063)	
Lagged log of empl within 5km		0.152	
		(0.127)	
Lagged own emp share (5km)		16.035**	
		(5.373)	
Lagged input ind share (5km)		-1.454*	
		(0.735)	
Lagged output ind share (5km)		0.454	
		(0.611)	
Lagged industrial diversity		0.165	
		(0.276)	
AU Emp Density §§		-0.407**	
		(0.065)	
Emp density within 5km §§		0.194	
		(0.162)	
ln Population Density (5km)		0	
		(0.155)	
Population: % Migrant		-0.529	
		(0.627)	
Population: % New to area		3.930**	
		(1.110)	
Population: % DegreeQual		0.067	
		(0.883)	
log of lagged exits		0.476**	
		(0.069)	
ln(lag own ind exits)		0.045	
		(0.037)	
AU count	2,664	2,664	
log likelihood	-3416	-3195	
Negbin Dispersion (log)	-1.379**	-2.664**	
	(0.202)	(0.353)	
Negbin Dispersion	0.252	0.07	

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

	Location Choice Regressions			*Production Function Regressions*		
INDUSTRY: L78_Busserv	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	0.201**	0.194**	log(Intermed)	0.490**	0.482**	0.477**
	(0.041)	(0.031)		(0.00394)	(0.00404)	(0.00464)
Log of land price within 5km	0.164**	-0.046	log (Capital)	0.127**	0.118**	0.147**
	(0.048)	(0.069)		(0.00350)	(0.00568)	(0.00340)
log of AU employment	0.686**	0.203**	log(Emplt)	0.422**	0.427**	0.354**
	(0.031)	(0.034)		(0.00538)	(0.00649)	(0.00632)
CBD indicator		-0.1	CBD indicator		0.122**	-0.0292
		(0.099)			(0.0341)	(0.0364)
Near Supermarket (§)		-0.025	Near Supermarket (§)		-0.0126	0.00277
		(0.035)			(0.0107)	(0.0107)
Near Motorway ramp (§)		0.041	Near Motorway ramp (§)		0.00473	0.00374
		(0.030)			(0.00848)	(0.00931)
Near Railway Station (§)		-0.038	Near Railway Station (§)		-0.00282	0.00704
		(0.028)			(0.0111)	(0.0123)
Near Bank (§)		0.035	Near Bank (§)		0.0116	0.00628
		(0.035)			(0.00979)	(0.00993)
Near Airport (§)		-0.160*	Near Airport (§)		0.00706	-0.0349
		(0.072)			(0.0275)	(0.0319)
Near CBD(§)		0.208**	Near CBD(§)		-0.0421*	0.0189
		(0.057)			(0.0207)	(0.0210)
Near Port (§)		0.055	Near Port (§)		0.0224	0.0075
		(0.038)			(0.0170)	(0.0118)
Lagged log of empl within 5km		-0.203**	Log of empl within 5km		0.0332	0.00697
		(0.066)			(0.0230)	(0.0254)
Lagged own emp share (5km)		0.842	Own emp share (5km)		-0.156	-0.108
		(0.905)			(0.303)	(0.253)
Lagged input ind share (5km)		0.668	Input ind share (5km)		-0.249	-0.0213
		(0.557)			(0.138)	(0.154)
Lagged output ind share (5km)		-1.055*	Output ind share (5km)		-0.0115	0.167
		(0.444)			(0.118)	(0.131)
Lagged industrial diversity		-0.017	Industrial diversity		-0.0827	0.00277
		(0.204)			(0.0569)	(0.0480)
AU Emp Density §§		-0.266**				
		(0.041)				
Emp density within 5km §§		-0.209	Emp density within 5km §§		0.0800**	-0.0121
		(0.117)			(0.0294)	(0.0368)
ln Population Density (5km)		0.204	ln Population Density (5km)		-0.0133	-0.00622
		(0.106)			(0.0243)	(0.0289)
Population: % Migrant		-0.193	Population: % Migrant		-0.193	0.276
		(0.481)			(0.139)	(0.168)
Population: % New to area		2.148**	Population: % New to area		0.197	-0.192
		(0.751)			(0.260)	(0.239)
Population: % DegreeQual		0.485	Population: % DegreeQual		0.734**	-0.0564
		(0.627)			(0.209)	(0.183)
log of lagged exits		0.414**	% non-Akld Emp		-0.192	0.109
		(0.046)			(0.284)	(0.286)
ln(lag own ind exits)		0.144**	Only in Auckland		0.0209	0.0519*
		(0.032)			(0.0279)	(0.0240)
AU count	2,664	2,664	Observations	101,046	101,046	101,046
log likelihood	-5565	-5173	* distinct firms			29,982
Negbin Dispersion (log)	-1.548**	-2.671**	R-squared	0.774	0.777	0.493
	(0.142)	(0.188)	RTS	1.038**	1.026**	0.978**
Negbin Dispersion	0.213	0.069	RTSse	(0.003)	(0.003)	(0.006)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

	Location Choice Regressions		*Production Function Regressions*
INDUSTRY: M_Govt	*Negbin IV*	*Negbin IV*	
Log of Land Price per hectare	0.241	0.016	
	(0.134)	(0.181)	
Log of land price within 5km	-0.353	0.227	
	(0.189)	(0.463)	(not part of the measured sector)
log of AU employment	1.197**	0.396	
	(0.088)	(0.217)	
CBD indicator		0.143	
		(0.794)	
Near Supermarket (§)		-0.238	
		(0.207)	
Near Motorway ramp (§)		0.393*	
		(0.173)	
Near Railway Station (§)		-0.041	
		(0.210)	
Near Bank (§)		0.284	
		(0.192)	
Near Airport (§)		0.095	
		(0.369)	
Near CBD(§)		0.641	
		(0.334)	
Near Port (§)		-0.063	
		(0.233)	
Lagged log of empl within 5km		-0.483	
		(0.405)	
Lagged own emp share (5km)		-10.876	
		(5.713)	
Lagged input ind share (5km)		-7.441*	
		(3.507)	
Lagged output ind share (5km)		1.367**	
		(0.528)	
Lagged industrial diversity		-0.58	
		(1.388)	
AU Emp Density §§		0.004	
		(0.283)	
Emp density within 5km §§		-0.16	
		(0.593)	
ln Population Density (5km)		0.011	
		(0.684)	
Population: % Migrant		-4.542	
		(3.635)	
Population: % New to area		8.007	
		(7.469)	
Population: % DegreeQual		-8.377*	
		(3.701)	
log of lagged exits		0.347	
		(0.323)	
ln(lag own ind exits)		0.103	
		(0.226)	
AU count	2,664	1,144	
log likelihood	-423	-360	
Negbin Dispersion (log)	-2.921	-14.927**	
	(5.358)	(0.876)	
Negbin Dispersion	0.054	0	

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

	Location Choice Regressions		*Production Function Regressions*
INDUSTRY: N_Education	*Negbin IV*	*Negbin IV*	
Log of Land Price per hectare	0.265**	0.124	
	(0.058)	(0.074)	
Log of land price within 5km	-0.243**	-0.375	
	(0.059)	(0.194)	(not part of the measured sector)
log of AU employment	0.687**	0.346**	
	(0.048)	(0.083)	
CBD indicator		0.826	
		(0.439)	
Near Supermarket (§)		0.152	
		(0.082)	
Near Motorway ramp (§)		0.132*	
		(0.059)	
Near Railway Station (§)		-0.153	
		(0.091)	
Near Bank (§)		0.068	
		(0.084)	
Near Airport (§)		0.334	
		(0.205)	
Near CBD(§)		0.152	
		(0.185)	
Near Port (§)		-0.128	
		(0.102)	
Lagged log of empl within 5km		-0.233	
		(0.180)	
Lagged own emp share (5km)		1.266	
		(3.843)	
Lagged input ind share (5km)		1.473	
		(1.017)	
Lagged output ind share (5km)		-1.585	
		(1.581)	
Lagged industrial diversity		0.374	
		(0.498)	
AU Emp Density §§		-0.152	
		(0.094)	
Emp density within 5km §§		-0.081	
		(0.256)	
ln Population Density (5km)		0.435	
		(0.243)	
Population: % Migrant		-0.723	
		(0.957)	
Population: % New to area		4.223*	
		(1.756)	
Population: % DegreeQual		0.882	
		(1.548)	
log of lagged exits		0.167	
		(0.100)	
ln(lag own ind exits)		0.184	
		(0.104)	
AU count	2,664	2,608	
log likelihood	-2211	-2153	
Negbin Dispersion (log)	-0.977**	-1.472**	
	(0.168)	(0.213)	
Negbin Dispersion	0.376	0.23	

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

INDUSTRY:	*Location Choice Regressions*		*Production Function Regressions*
O_HealthCommunity	*Negbin IV*	*Negbin IV*	
Log of Land Price per hectare	0.262**	0.268**	
	(0.047)	(0.056)	
Log of land price within 5km	-0.036	-0.229	
	(0.068)	(0.152)	(not part of the measured sector)
log of AU employment	0.568**	0.243**	
	(0.038)	(0.055)	
CBD indicator		-0.096	
		(0.198)	
Near Supermarket (§)		0.094	
		(0.054)	
Near Motorway ramp (§)		0.035	
		(0.049)	
Near Railway Station (§)		-0.09	
		(0.056)	
Near Bank (§)		0.234**	
		(0.063)	
Near Airport (§)		0.017	
		(0.163)	
Near CBD(§)		-0.18	
		(0.119)	
Near Port (§)		-0.069	
		(0.072)	
Lagged log of empl within 5km		0.193	
		(0.119)	
Lagged own emp share (5km)		7.819	
		(7.449)	
Lagged input ind share (5km)		-0.353	
		(1.123)	
Lagged output ind share (5km)		-6.5	
		(7.709)	
Lagged industrial diversity		-0.207	
		(0.363)	
AU Emp Density §§		-0.387**	
		(0.066)	
Emp density within 5km §§		-0.209	
		(0.217)	
ln Population Density (5km)		0.298	
		(0.206)	
Population: % Migrant		-1.046	
		(0.717)	
Population: % New to area		1.175	
		(1.341)	
Population: % DegreeQual		1.257	
		(1.129)	
log of lagged exits		0.087	
		(0.066)	
ln(lag own ind exits)		0.243**	
		(0.068)	
AU count	2,664	2,648	
log likelihood	-3387	-3242	
Negbin Dispersion (log)	-0.977**	-1.615**	
	(0.130)	(0.139)	
Negbin Dispersion	0.376	0.199	

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

INDUSTRY:	*Location Choice Regressions*			*Production Function Regressions*		
P_CultRecrServ	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	0.121*	-0.019	log(Intermed)	0.695**	0.691**	0.549**
	(0.058)	(0.076)		(0.0106)	(0.0113)	(0.0139)
Log of land price within 5km	0.237**	-0.126	log (Capital)	0.110**	0.112**	0.133**
	(0.089)	(0.204)		(0.00959)	(0.00932)	(0.0101)
log of AU employment	0.632**	0.370**	log(Emplt)	0.235**	0.248**	0.233**
	(0.039)	(0.079)		(0.0147)	(0.0134)	(0.0168)
CBD indicator		-0.593*	CBD indicator		-0.224**	-0.186
		(0.301)			(0.0746)	(0.169)
Near Supermarket (§)		0.117	Near Supermarket (§)		0.015	0.0193
		(0.075)			(0.0199)	(0.0383)
Near Motorway ramp (§)		-0.006	Near Motorway ramp (§)		-0.0323	0.0123
		(0.060)			(0.0208)	(0.0333)
Near Railway Station (§)		-0.001	Near Railway Station (§)		-0.0640*	0.0527
		(0.062)			(0.0267)	(0.0420)
Near Bank (§)		0.088	Near Bank (§)		0.0529**	0.02
		(0.069)			(0.0182)	(0.0320)
Near Airport (§)		-0.064	Near Airport (§)		0.0239	0.125
		(0.168)			(0.0532)	(0.149)
Near CBD(§)		0.395**	Near CBD(§)		0.0894*	0.116
		(0.129)			(0.0414)	(0.0808)
Near Port (§)		-0.14	Near Port (§)		-0.00894	-0.0299
		(0.107)			(0.0328)	(0.0481)
Lagged log of empl within 5km		-0.07	Log of empl within 5km		-0.0141	0.0646
		(0.147)			(0.0471)	(0.0777)
Lagged own emp share (5km)		-5.191	Own emp share (5km)		0.278	-1.174
		(5.481)			(1.611)	(1.619)
Lagged input ind share (5km)		3.711*	Input ind share (5km)		0.491	1.206*
		(1.458)			(0.457)	(0.605)
Lagged output ind share (5km)		0.336	Output ind share (5km)		-0.0514	-1.554*
		(1.115)			(0.399)	(0.631)
Lagged industrial diversity		0.043	Industrial diversity		0.000254	-0.142
		(0.358)			(0.126)	(0.140)
AU Emp Density §§		-0.155				
		(0.084)				
Emp density within 5km §§		0.091	Emp density within 5km §§		-0.0768	-0.0986
		(0.201)			(0.0760)	(0.120)
ln Population Density (5km)		0.123	ln Population Density (5km)		0.0471	-0.148
		(0.247)			(0.0573)	(0.0862)
Population: % Migrant		-1.414	Population: % Migrant		0.0955	1.186*
		(0.922)			(0.347)	(0.595)
Population: % New to area		1.879	Population: % New to area		-0.506	0.238
		(1.667)			(0.625)	(0.727)
Population: % DegreeQual		-0.598	Population: % DegreeQual		-0.214	-1.520*
		(1.367)			(0.419)	(0.635)
log of lagged exits		0.209*	% non-Akld Emp		0.0867	-0.926
		(0.088)			(0.662)	(1.017)
ln(lag own ind exits)		0.129	Only in Auckland		0.0508	0.0896
		(0.069)			(0.127)	(0.0893)
AU count	2,664	2,640	Observations	13,620	13,620	13,620
log likelihood	-2522	-2401	* distinct firms			4,149
Negbin Dispersion (log)	-1.062**	-1.911**	R-squared	0.749	0.752	0.384
	(0.204)	(0.272)	RTS	1.041**	1.051**	0.914**
Negbin Dispersion	0.346	0.148	RTSse	(0.011)	(0.011)	(0.018)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

	Location Choice Regressions			*Production Function Regressions*		
INDUSTRY: Q_PersServ	*Negbin IV*	*Negbin IV*		*OLS*	*OLS*	*Firm FE*
Log of Land Price per hectare	0.208**	0.085	log(Intermed)	0.629**	0.629**	0.574**
	(0.039)	(0.050)		(0.0106)	(0.0108)	(0.0133)
Log of land price within 5km	-0.144**	-0.082	log (Capital)	0.158**	0.154**	0.197**
	(0.046)	(0.131)		(0.00741)	(0.00748)	(0.00837)
log of AU employment	0.604**	0.234**	log(Emplt)	0.308**	0.316**	0.283**
	(0.026)	(0.048)		(0.0107)	(0.0106)	(0.0121)
CBD indicator		0.067	CBD indicator		-0.0114	0.0399
		(0.186)			(0.0518)	(0.102)
Near Supermarket (§)		0.209**	Near Supermarket (§)		0.00658	0.0119
		(0.046)			(0.0150)	(0.0220)
Near Motorway ramp (§)		-0.037	Near Motorway ramp (§)		-0.00676	-0.0014
		(0.039)			(0.0115)	(0.0197)
Near Railway Station (§)		-0.041	Near Railway Station (§)		0.009	0.00592
		(0.038)			(0.0137)	(0.0240)
Near Bank (§)		0.086	Near Bank (§)		0.00978	0.0178
		(0.045)			(0.0140)	(0.0184)
Near Airport (§)		-0.045	Near Airport (§)		-0.0371	0.01
		(0.100)			(0.0320)	(0.0626)
Near CBD(§)		0.05	Near CBD(§)		-0.0251	-0.0681
		(0.087)			(0.0253)	(0.0476)
Near Port (§)		0.002	Near Port (§)		0.0348*	-0.0419*
		(0.060)			(0.0164)	(0.0204)
Lagged log of empl within 5km		-0.041	Log of empl within 5km		0.0325	0.0356
		(0.111)			(0.0321)	(0.0432)
Lagged own emp share (5km)		0.141	Own emp share (5km)		0.633	2.583
		(4.184)			(1.107)	(1.496)
Lagged input ind share (5km)		1.119	Input ind share (5km)		-0.0448	0.142
		(0.742)			(0.200)	(0.290)
Lagged output ind share (5km)		-0.807	Output ind share (5km)		-0.00499	-0.289
		(0.722)			(0.170)	(0.270)
Lagged industrial diversity		0.113	Industrial diversity		-0.0795	-0.0319
		(0.268)			(0.0700)	(0.0672)
AU Emp Density §§		-0.095				
		(0.056)				
Emp density within 5km §§		0.007	Emp density within 5km §§		0.0476	0.073
		(0.174)			(0.0416)	(0.0596)
ln Population Density (5km)		-0.021	ln Population Density (5km)		-0.033	-0.0246
		(0.173)			(0.0333)	(0.0458)
Population: % Migrant		1.483**	Population: % Migrant		0.102	-0.151
		(0.536)			(0.203)	(0.248)
Population: % New to area		0.401	Population: % New to area		-0.630	-0.265
		(0.952)			(0.337)	(0.430)
Population: % DegreeQual		-0.47	Population: % DegreeQual		0.461*	0.446
		(0.875)			(0.192)	(0.335)
log of lagged exits		0.324**	% non-Akld Emp		-0.34	-0.0363
		(0.058)			(0.339)	(0.524)
ln(lag own ind exits)		0.187**	Only in Auckland		0.0721	-0.0629
		(0.040)			(0.0641)	(0.0563)
AU count	2,664	2,648	Observations	17,451	17,451	17,451
log likelihood	-3610	-3470	* distinct firms			4,953
Negbin Dispersion (log)	-1.852**	-3.002**	R-squared	0.861	0.863	0.654
	(0.178)	(0.326)	RTS	1.096**	1.099**	1.054**
Negbin Dispersion	0.157	0.05	RTSse	(0.006)	(0.006)	(0.012)

Notes: For location choice regressions: Dependent variable is the number of firms choosing each AU. Observation is an AU in a year. Robust standard errors with clustering on AU. Instruments pass Kleibergen-Papp weak instrument test (p=0). For productivity regressions: Dependent variable is the log of gross output. Observations are for enterprises in a year. Robust standard errors with clustering by firm in the first column and by AU in other columns. Significance: **:1%. *:5%.(For RTS, significance indicates difference from 1). Counts of observations and enterprises have been rounded in accordance with Statistics New Zealand's confidentiality policies. §: Proximity measures are entered as -1 * log of distance (in km). §§: Density entered as -1* log of land area (hectares). RTS: Returns to scale. All regressions also include year-specific intercepts

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