Marshallian Sources of Growth and Interdependent Location of Swedish Firms and Households

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Abstract

This thesis consists of three papers that examine Marshallian sources of growth and interdependent location of Swedish firms and households.

Paper [I] examines the impact of static and dynamic knowledge externalities and their impact on Swedish market operating firms growth pattern between 1997 and 2005. The three types of externalities are: (i) Marshall-Arrow-Romer (MAR), (ii) Jacobs, and (iii) Porter. My empirical findings for the 40 industries can briefly be summarized in the following points: (i) static MAR, Jacobs and/or Porter externalities are present in all but nine industries; (ii) except for five cases all industries are exposed to one or more of the MAR, Jacobs and/or Porter type of dynamic externalities; (iii) contrary to previous studies but in line with theoretical predictions, we do find positive and significant effects for static as well as dynamic Jacobs externalities.

Paper [II] focuses on the presence of agglomeration economies in the form of labor pooling and educational matching and their impact on economic growth in Swedish manufacturing and service industries from 1997 to 2005. To accomplish this I employ a translog production function that enables me to decompose the total agglomeration elasticities into returns that accrue to: direct agglomeration effects, an indirect effect of agglomeration at given input levels, a cross agglomeration effect of matching on labor pooling and vice versa. Household services is the single industry where both the labor pooling and matching hypothesis is supported by our data. Publishing is the sole instance of better input usage due to matching consistent with the theoretical claim.

Paper [III] studies the interdependent location choices of households and firms expressed as population and employment in Swedish municipalities. Using a model of the Carlino-Mills type to investigate the impact of various location attributes such as differences in public revenue and spending patterns, accessibility to jobs and potential workforce, quality of the labor pool, concentration of commercial, private and public services. The findings suggest that fiscal factors significantly alters the impact of housing and accessibility attributes compared to exiting studies on Swedish data. Another finding, in line with previous studies, indicate that there is a significant degree of inertia in household and firm location choices.

Keywords: Information and knowledge spillover; MAR, Jacobs and Porter externalities; labor pooling; interdependent location choice; panel data
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This thesis consists of a summary containing an introduction, a background to the study of growth and location patterns, theoretical underpinning, related empirical studies, methodological issues, summary of papers, policy relevance and implications, and the following three self-contained papers:


1 Introduction

This thesis consists of three self contained papers that deal with Marshallian sources of growth and interdependent location of Swedish firms and households. The three problems that I study can succinctly be summarized under the headings: growth effects of knowledge transfer; growth enhancing spillovers due to labor pooling and educational matching; and interdependent location patterns of firms and households.

The first question addresses what type of knowledge spillovers that serve as the dominant channel for knowledge transfer and subsequent growth of single plant firms. The different externalities derive from the interaction of economic agents where the learning activity by one firm may rise the productivity of other firms as the by product of knowledge spillovers between firms, and therefore these effects should be more extensively marked when agents are in close proximity to one and other. According to the literature there are three different types of externalities, referred to as MAR, Jacobs, and Porter, jointly sharing the view that innovations and improvements in a particular firm increase the growth of other co-located firms; however, the sources of these externalities differ.

The second question centers on whether labor pooling and educational matching influence growth. The underlying hypothesis, on the one hand, centers on the idea that a larger pool of workers in a given area makes it easier in general for firms to hire workers, furthermore a larger labor pool makes it more likely to find workers with the specific characteristics the firm needs. On the other hand, workers are more likely to find a job that match their skills. Labor market pooling might therefore also improve the matching between workers and firms. The source of the growth effect that firms experience may thus be attributable to labor pooling or matching (or both), to disentangle what type of force that is at work, both of them are addressed in conjugate.

The third question treats the interdependent population and employment location patterns where explicit attention is paid to the impact of the various attributes such as local public revenue and spending patterns, amenities, etc. The interregional location decisions by firms and households are treated as
a simultaneous process because household locations, to a large extent, determine both the available labor pool and non manufacturing market size facing firms, whilst firm location determine the available employment opportunities facing households. Still, part of the workforce commutes between their place of residence and place of work which implies that characteristics in nearby municipalities might influence the respective location decisions as well.

The rest of this introduction and summary is organized as follows. Section 2.1 outlines a background description to growth and location patterns in Sweden. Section 2.2 links up with the theoretical underpinning that this thesis draws on. Section 2.3 covers related empirical studies. Section 2.4 concerns some methodological issues. Section 3 contain a summary of the three papers. Finally Section 4 ties in to policy relevance and implications.

# 2 Growth and location patterns

## 2.1 Background

Since the beginning of the 1990's commuting is part of every day life for well over eight hundred thousand people. In this instance, an individual is considered to be a commuter if the place of work and place of residence are located in different municipalities. Apart from a dip in the early 90's, at the same time as Sweden experienced a considerable economic downturn, commuting have steadily increased since, to more than 1.2 million people as illustrated in Figure 1. The trend in migration, the darker shaded area in Figure 1, starts off at over 240 thousand in the beginning of the 90's and reaches over 320 thousand in the final year. Migration very much follows the same pattern as commuting for the illustrated time period, although at a substantially lower levels.

An alternative way of illustrating the rising trend in both commuting and migration is to normalize the absolute numbers by employment and population in the relevant age group as in Figure 2. This figure displays that the share of population migrating, is relatively constant at approximately five percent throughout the time period, and thus the increase appears as considerably more modest in comparison to that of Figure 1. In contrast, the share of
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employment commuting exhibits a more clearly identifiable upward trend that

Figure 1: Commuting and migration among individuals aged 20-64 years. Commuters are light shaded. Source: Statistics Sweden (SCB).

Figure 2: Commuting and migration normalized by employment and population aged 20-64 years. Commuters are light shaded. Source: SCB.
increases from around twenty two percent to just over thirty percent. This development is also mirrored in the 20 percent decrease in labor market areas from 112 in 1990 to 90 in 2000. The witnessed trend in increasingly functional and spatial ‘separation’ of individuals place of work and place of residence serves both as a backdrop and motivation for the last paper of the thesis.

Figure 3: Value added by industry accumulated over the period 1997–2005 for single plant firms. Source: SCB.
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The illustrated pattern of value added by industry in Figure 3, resulting from economic growth over the time period 1997–2005, could in principle be achieved by either an increase in inputs, or by a better utilization of existing inputs, i.e. an increase in productivity, or a combination of both. The emphasis of what type of sources that is the most important for economic growth differs in the literature. At least three strands are discernable, the first focusing primarily on capital accumulation in its broadest sense to include both physical and human capital\(^1\), the second placing external economies in the forefront in the growth process where an individual firm’s accumulation of new capital inadvertently raises the productivity of other firms and growth can be sustained by accumulation of inputs that generate positive externalities\(^2\), and in the third economic growth is driven by innovations materialized by the purposeful investments made by entrepreneurs\(^3\). The empirical studies in paper [I] and [II] of this thesis are most closely related to the second strand with the focus on external economies as the source of growth.

2.2 Theoretical underpinning

The theoretical underpinning of this thesis draws on three different strands of the literature: the new growth theory; regional and urban economic theory; and from the field of feedback mechanisms and path dependence.

A central theme for a family of economic models labeled the new growth theory is the importance of spillovers as a source of economic growth. In a predecessor, the standard growth model formulated by Solow (1957) the economy is characterized by a production function transforming inputs to outputs. In this setting the growth of the economy derives from a combination of: the growth of inputs which turn into a growth of output; and technological change that enhance the efficiency with which inputs are transformed into outputs. This type of model is silent regarding the rate or source of technological change underlying the process of economic growth.

\(^1\)Exemplified by the work of Jones and Manuelli (1990) and King and Rebelo (1990) to name but a few.
\(^2\)See e.g. Arrow (1962), Lucas (1988), and Romer (1986, 1990).
\(^3\)Aghion and Howitt (1992), Grossman and Helpman (1991), and Young (1993).
In contrast to the Solow model that lacks a theory of innovation and diffusion of ideas, Romer (1986) exploits the notion of learning by doing introduced by Arrow (1962) argues that the experience of production induces productivity. But the learning by doing of one producer may also raise the productivity of other producers by spillovers of knowledge between producers. Another marked difference is that the level of technology can be influenced by producers themselves by research and development (R&D) activities. At the aggregate level, the potential for endogenous technical progress where the improvements can be shared in a non-rival fashion by all producers might serve as a path to evade diminishing returns (Romer 1990; Lucas 1988).

The shift in new growth theory from material to immaterial inputs and more specifically to the positive externalities emanating from knowledge spillovers points to a possible under-investment in knowledge as producers recognize the potential for own R&D efforts leaking or being lost to rival producers (Griliches 1992). The possibility of under-investment in R&D and knowledge production in general have spurred policy actions to increasingly focus on either direct subsidies to R&D, or provide incentives to increase the knowledge diffusion from public research institutions to market operating firms in the business sector as well as to the wider civil society.

Another field of immediate interest to this thesis, and partially related to the new growth theory, is economies of agglomeration that concerns the external economies that a firm might benefit from by being located in the vicinity of other firms. The central theme presume that clustering of economic activities occurs because firms derive benefits from spillovers of other nearby firms. A broad distinction of agglomeration economies is made between localization and urbanization economies. The distinction relates to wether the benefits from co-location transmits within or between industries. Localization economies are associated with the transmission of benefits that a firm derive from co-locating near other firms within the same industry. Whereas urbanization economies are associated with the transmission of benefits that a firm derive from co-locating near other firms irrespective of industry.

Localization economies in turn are based on the Marshallian trinity based on labor market pooling, availability of intermediate/final goods producers,
and technological spillovers, respectively (Henderson 2003). The strength of localization economies is greater the larger the industry, rather than the firm itself, is in a particular region.

Urbanization is often represented by the total population or total employment for a particular locality, city, region or the alike. The firms derive benefits from the external economies through savings from the large scale operations of the area in its entirety. Without any further operational specification urbanization economies have somewhat of a catch-all character as it could relate to consumption possibilities, home market effects, interaction opportunities, public service provision, etc.

A more precise meaning closely related to urbanization economies is Jacobs (1969) emphasis of diversity in the urban industry mix, particularly in relation to the growth effects caused by information spillovers. A diverse industry mix in a given locality improves the likelihood to exchange, imitate, alter and recombine products, processes or ideas, therefore diversity per se might be a source of knowledge spillover that spurs growth.

The corresponding knowledge spillovers in a localization setting is commonly referred to as Marshall-Arrow-Romer (MAR) externalities (in reference to Marshall (1890), Arrow (1962), and Romer (1990)) that focus on knowledge spillover among firms within the same industry were concentration in a specific location promotes knowledge spillover between firms and subsequently promotes economic growth.

As a third possible hypothesis regarding information spillovers Porter (1990) advance an idea that bear resemblance to MAR, in the respect that it emphasize concentration within the same industry as the dominant channel for spillover between firms. At the same time Porter also stresses the importance of local competition of ideas that promotes growth by rapid adoption of innovation and dissemination of local information. As case evidence Porter (1990) provide examples from the ceramics and gold jewelery industry in Italy as industries where numerous firms are co-located and compete intensively for ideas.

The issue of regional specialization versus regional diversity is but one theoretical controversy regarding the promotion of knowledge spillovers. Another
central theme centers around the degree of local competition or the extent of local monopolistic competition. The MAR hypothesis predicts that a certain extent of local monopoly power is superior to local competition because it enables firms to appropriate the value of investments made in new knowledge. Whereas Porter (1990, pp. 119–120) argues in favor of competition on the grounds that competition is more conducive to a rapid adoption of new ideas. Although Jacobs’ (1969) also favors competition to monopolistic competition the emphasis is different. Jacobs notion of competition do not relate to the pricing strategy in a product market in the traditional sense of the industrial organization literature, but rather to the competition of new ideas embodied in economic agents. Apart from that a larger number of firms provide greater competition for new ideas it also facilitates the entry of new firms specializing in new niche products. The driving force is the availability of the necessary complimentary inputs and services from small specialized niche firms, enabling the entrants recombination and adaption of existing products and services into new ones, which in comparison is harder to come by from large vertically integrated firms.

W. Brian Arthur’s contributions in the field of feedback mechanisms and path dependence in conjugation to agglomeration economies is also of interest to this thesis. Arthur (1990) examines the argument that the presence of increasing returns implies that say, one product or one technology out of several possible must come to dominate a market. The argument is studied in the context of industrial location and regional economics.

As Arthur (1990) self puts it “...paper attempts to provide a sound theoretical basis for the historical-accident-plus agglomeration viewpoint”. In particular he constructs a model of industry location where firms choosing among regions are attracted by agglomeration economies due to the presence of other firms in these regions, and where historical “accident” enters because firms are heterogenous in their locational tastes and enter the industry in random order⁴.

Arthur’s findings can be summarized in four points. (i) If there is no upper bound to economies of agglomeration, industry will cluster in one location, but

⁴For a deterministic framework of analysis, as opposed to Arthur’s stochastic approach, see David and Rosenbloom (1990).
which one depends on both geographical attractiveness and accidental historical order of choice among the entrants. (ii) The presence of agglomeration economies does not guarantee a single monopolized outcome. (iii) Where there are upper bounds to agglomeration economies, certain combinations of historical accident can produce a single dominant location; whereas other combinations can produce locational dispersion of the industry as if agglomeration economies where absent. (iv) Contrary to intuition, agglomeration effects can cause regional separation of the industry.

2.3 Related empirical studies

There are several empirical studies devoted to spatially bounded spillovers, for instance Cingano and Schivardi (2004), Dekle (2002), and Henderson (2003) related to paper [I], and agglomeration economies such as Fogarty and Garofalo (1988), Louri (1988), Graham (2009), and Graham and Kim (2008) related to paper [II].

The spatially bounded character of the spillovers and the different impacts for different industries suggests that there is a need for highly disaggregated data as regards both industrial sectors as well as the spatial scale. As the availability of ever more finely grained data increase, the trend of studies of spatially bounded spillovers exploited this advent and witnessed a parallel upsurge going from primarily cross-sectional data where the spatial scale where represented by a few dummy variables (Åberg, 1973; Sveikauskas, 1975; Glaeser et al., 1992; Glaeser et al., 1995) to the more extensive use of more comprehensive panel data sets (Graham, 2009; Graham and Kim, 2008; Henderson, 2003)\textsuperscript{5}.

There are a number of previous studies closely related to the one in paper [III] that model the joint determination of household and firm location such as Carlino and Mills (1987), Schmitt and Henry (2000), Holmberg et al. (2003), and Crown (1991).

The joint treatment of the interregional location decisions of firms and households as a simultaneous process are motivated by the fact that house-

\textsuperscript{5}It should be noted that even though in a strict sense Graham (2009) Graham and Kim (2008) do have panel data at their disposal they only make use of cross-sectional data due to their concerns regarding the uncertain data quality in the time dimension.
hold locations to a large extent determine both the available labor pool and non manufacturing market size facing firms, and firm locations determine the available employment opportunities facing households. Still, part of the workforce commute over space between their place of residence and place of work which implies that characteristics in nearby municipalities might influence the respective location decisions as well. Two different approaches to address this issue are: either to enlarge the study area to include population and employment in a relevant labor market area as in Boarnet (1994), recurring in among others Deitz (1998), Schmitt and Henry (2000); or to introduce an accessibility measure to reflect the transport infrastructure service as in Holmberg et al. (2003).

2.4 **Data and methodological issues**

This thesis deal with a number of methodological issues such as observable and unobservable heterogeneity in papers [I] and [II], robust estimation, weak instruments, and to a minor extent tests of spatial autocorrelation in paper [III].

Heterogeneity is an all pervasive element in preferences, beliefs, tastes, abilities, or constraints among individuals, or characteristics of firms, groups of individuals, regions, countries, etc. While being a natural ingredient and source of influence in the choices and actions of actors in their every day life, it is at times ranging from being fully- to partially- to unobservable to the researcher\(^6\).

The need for and ways to incorporate and handle heterogeneity are context based, depending on the problem, data, and model frame work at hand. In the empirical papers [I] and [II] of this thesis I address observable heterogeneity by separately treating the different industries, instead of grouping them together as one. While the unobservable heterogeneity, (based on pretesting) are addressed by individual and time fixed effects. Heterogeneity in household preferences for choices of where to live, and the interdependent heterogeneity in tastes that influence the location choice of firms, conjointly serves as an underlying driving

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\(^6\)For the pervasiveness of heterogeneity, see Heckman (2001), for a definition of heterogeneity, see Cunha, Heckman and Navarro (2005), and for microeconometric modeling of heterogeneity, see Browning and Carro (2007).
force in their response to differences in municipal attributes that are studied in paper [III]. In this instance the heterogeneity in preferences, tastes, and attributes constitutes the driving force of the interdependent location choice.

The different types of external economies covered in paper [II] are labor pooling and matching, and knowledge spillovers in paper [I]. A common denominator of these externalities are the spatially bounded character of these

Figure 4: Percentage points of plants lost due to excluding multi plants. Source: SCB.
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spillovers. As an immediate consequence, the firms included in the first and second paper are single plant firms since these are the only entities with an unambiguous location in comparison to multi plant firms where several plant locations are indeed possible. To illustrate the coverage of single plants in relation to multi plants Figure 4 illustrates the percentage points of plants lost due to excluding multi plants, for a two and three digit industry classification comprising 40 industry aggregates. Despite the impression of a sizeable loss of observations the remaining observations for the 40 industries ranges from well over 250 to 900 000.

Another way of illustrating the coverage is in terms of the value added lost due to excluding multi plants as in Figure 5. Even though the maximum loss in terms of observations in Figure 4 is below 25 percent for all of the 40 industries, the maximum vale added loss exceeds 90 percent for two industries in Figure 5. A fact that has to be born in mind when interpreting the results in papers [I] and [II].

The increased use of panel data is in part related to its usefulness compared to pure cross-sectional or time-series data. Baltagi (2005) lists a number of benefits and limitations of panel data. First of all, panel data allows to control for individual heterogeneity among individuals, firms, regions or countries. It has the ability to control for state and time invariant variables whereas time-series and cross-section data cannot. Second, it gives more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency. The variation can be decomposed into between and within variation for the observational unit at hand. Third, panel data are better suited to study dynamics of adjustment as regards how a state variable change for the observational unit as well as to determine who among the observational units are affected by the change. Fourth, it provide the ability to identify and measure effects that are not detectable in pure cross-section or time-series data. The use of a time invariant metric across the period of observation allows for inference on intra rather than inter-individual comparison.

Among the limitations of panel data one might include the following. A first consideration relates to the short time-series dimension in typical micro panel. This implies that the asymptotic’s rely on the number of individuals going
to infinity, unless a costly increase in extending the time span is an option. A second problem, and essentially the flip side to the previous problem, is not uncommon for macro panels of regions or countries with long time series that do not account for cross-country dependence, possibly causing misleading inference.

Figure 5: Percentage of value added lost by excluding multi plants. Source: SCB.

Despite the virtues of panel data there are clearly associated problems as well, among the benefits, points one, two and four as well as the drawback
of point one are all of immediate interest in relation to papers [I] and [II]. In these two papers I apply a cluster robust within estimator, based on a series of robust Hausman specification tests, to the two unbalanced short panels.

To address the interdependence between population and employment in the two simultaneous interaction models, in paper [III], I make use of the robust single equation GMM estimation technique that dispense from onerous distributional assumptions. Related to the choice of estimation technique, attention is also payed to the issue of weak instruments, i.e., when the instrumental variables are only weakly correlated with the endogenous right hand side variable. Tests are performed to determine whether the instruments comply with the required conditions. Another set of standard tests are also performed to detect any influence of spatial autocorrelation as well as a non-standard heteroskedastic robust Moran’s I test.

3 Summary of papers


In this paper we address the question of what type of knowledge spillovers that serve as the dominant channel for knowledge transfer and subsequent growth of single plant firms. The different externalities stem from the interaction of economic agents and therefore these effects should be more extensively marked when agents are in close proximity to one and other. According to the literature there are three different types of externalities, referred to as MAR, Jacobs, and Porter, jointly sharing the view that innovation and improvements in a particular firm increase the growth of other co-located firms; however, the sources of these externalities differ.

A common denominator for the three types of externalities is the focus on proximity, in the sense that information is local in it’s character, and agents intentional or unintentional information exchange is contingent upon among other things, the relative ease with which agents can: (i) engage in face-to-face contacts; (ii) observe market conditions related to demand (supply) for new and
specialized final outputs (of intermediate service inputs); (iii) taping into tacit knowledge or local trade secrets, all facilitating spillover or cross fertilization of ideas.

The present paper adds to this literature by studying the presence and impact of the three different static and dynamic externalities by using comprehensive register data kept by Statistics Sweden, containing plant level micro data utilized to estimate production functions for 40 two/three-digit industries comprising both manufacturing and service industries. To the best of my knowledge, this distinguish the data set put to use here in comparison to previous studies, in the respect that it rely exclusively on micro data instead of an industry-region data structure, as well as the vast scope of, in all, 40 industries considered, and finally the non-merger of micro data and grouped areal data. In addition, I perform explicit tests to discriminate between the three non-nested externality hypothesis something which is new to this study.

The empirical findings can briefly be summarized in the following points: (i) static MAR, Jacobs and/or Porter externalities are present in nearly one-third of the industries; (ii) except for six cases all industries are exposed to one or more of the MAR, Jacobs and/or Porter type of dynamic externalities; (iii) contrary to previous studies but in line with theoretical predictions, I do find positive and significant effects for static as well as dynamic Jacobs externalities.

3.2 Paper [II] Do labor pooling and educational matching influence growth?

This paper provides an analysis of agglomeration economies in the form of labor pooling and educational matching and their respective impact on economic growth. The joint treatment of the labor pooling and matching hypothesis is motivated by the Marshallian equivalence, i.e. agglomeration economies could be the outcome of several different driving forces. Thus, to disentangle what type of force that is at work, both of them are addressed in conjugate.

To accomplish this I employ a translog production function that enables us to decompose the total agglomeration elasticities into returns that accrue to: direct agglomeration effects, an indirect effect of agglomeration at given input
levels, a cross agglomeration effect of matching on labor pooling and vice versa, and finally the respective agglomeration effects on returns to scale.

In contrast to the more recent studies with a similar focus I utilize the panel structure of the data. This study also differs in comparison to other studies in this field by not only focusing on the overall availability of labor but also to control for the quality of labor by educational matching and vice versa.

The empirical findings do not lend any clear cut case for either the labor pooling or matching hypothesis as an alleged source of growth. Household services is the single industry where both the labor pooling and matching hypothesis is supported by our data. Publishing is the sole instance of better input usage due to matching consistent with the theoretical claim. In three industries the increasing returns to scale result although significant, is just partially supported for individual pairs of input-components, as evidence in support of the gains from sharing a common labor pool.


This paper examines the interdependent population and employment location choices in Swedish municipalities from 1994 to 2004 were explicit attention is paid to the impact of the various attributes such as local public revenue and spending patterns, amenities, accessibility to jobs, quality of the labor pool, concentration of commercial, private and public services.

In contrast to other works explicit tests are performed to discern first whether there exist any substantive spatial effects between municipalities due to neighbouring municipality characteristics - as opposed to a prior specifying a spatial structure, and second whether or not the problem of weak instruments is present. This is a distinguishing feature in relation to previous studies.

In the empirical analysis I find that there is a significant degree of inertia in household and firm location choices as suggested by the elasticity estimates were own and cross elasticities of population and employment have the largest impact followed by public expenditures on schooling. Furthermore the inclusion
of local public revenue and spending patterns substantively alters the impact of transport infrastructure compared to previously reported findings on Swedish data.

### 4 Policy relevance and implications

The results of the three papers in this thesis points to the factors that are of relevance for the location choice of household and firms as well as the sources of agglomeration economies that enhance firms growth. These findings points to a number of different policy measures that could possibly serve to attract both household and firms. Having said that, it is crucial to acknowledge the difficulties to achieve any such clear cut policy prescriptions for the following reasons. A first motivation relates to the various preconditions that apply to differences regarding the types of problems faced and the stage of development in a specific region. Another argument has to do with whether the focus of the policy is directed towards incumbent firms or new entrants where the needs and responsiveness clearly differ. A further issue concern the inertia and incremental character in the growth process, that underlines the need not to prematurely end or radically shift a policy once in place for the want of quick results, since the time frame might very well stretch beyond the current term in office or political election cycle.

Temple (1998) identifies three possible areas for policy intervention for the co-location or clustering of industries directed towards: the attainment of critical mass; the promotion of cooperative activities across firms and other institutions; and the coordination of investment decisions.

A policy for the attainment of critical mass might consist of a number of temporary financial, or fiscal interventions, or combinations thereof, that lower the location or entry barrier of firms to the point where positive and self reinforcing feedback effects of agglomeration sets in. This kind of policy is likely to be most effective in situations of initial development phases either to attract a certain type of industry previously lacking/absent in the location or as a general measure to attract industries to designated target areas.
Policies targeted towards the promotion of cooperative activities across firms and other institutions, aims at nurturing the positive externalities generated by the co-location of firms in a region, and seeks to influence the speed of growth of these industries. In this instance the firms considered comprise both the birth of new firms and the ones previously located outside a given locality. A policy of this type could therefore focus on increasing the birth rate or decreasing the death rate, or a combination thereof, through start-up incentives, provision of business incubators, seed capital, mediating venture capital, and support of business services.

The third category, coordination of investment decisions refers to policies that are designed to increase regions growth potential in their capacity to sustaining a given number of firms. As such this capacity is a function of the local endowment of resources, broadly defined as inputs and infrastructure, and of the average level of utilization of these resources at a given location. Therefore a policy directed at increasing the quantity and quality (or both), of inputs and infrastructure qualify as a coordination of investment policy.

To give some intuition it can be useful to exemplify the three different types of policies in relation to the type of targeted objects, development stage of regions, required time span to implement the various policy measures. Attainment of critical mass policy is likely to foremost target publicly controlled firms and institutions as the scale of effort to induce an agent to locate in a region where few or non previously have chosen to locate on a voluntary basis is substantial. The implementation phase on the other hand, given the structure of ownership, is rather swift and results should be visible in the short run. This type of measure is probably to be most effective when directed towards less developed areas.

Like the former measure, policies to promote cooperative activities across firms and other institutions primarily target firms. Again this type of policy is expected to show results in the short term time range. Thus, there are close points of similarity between the two measures in these respects. On the other hand this policy is better suited for developing regions where the primary problem is one of the continuing establishment and survival of firms. Exemplified by fiscal allowances, start-up incentives, and information diffusion
programs, just to name a few.

In contrast to the two previous policies, the coordination of investment decisions address issues regarding the wider economic environment and the infrastructure of the local economic system. This measure could include for example the establishment of science parks, and improving the regional transport and communication infrastructure. As such, this type of policy operates and requires a longer time scale to be effective. Whilst being more gradual and long term this policy has the potential to shift the local economic capacity and long-run growth and not merely influence the speed of growth. In increasing the overall capacity, this policy intervention is best suited for developed regions where the rivalry for inputs and congestion of infrastructure are the main obstacles to further growth.

This type of policy intervention, apart from targeting firms, also has a more profound impact on households choice of location in comparison to the other types of policy measures. Even though there are a clear interdependence between firms and households choice of location, absent any sort of policy intervention, the measures relating to infrastructure in the last category have complimentary benefits that also accrue to households. Policies targeting education and vocation qualify as another field where complimentary benefits are shared between households and firms. As such, this type of policy intervention clearly relate to research question two and three in the introductory section and the results in papers [II] and [III] of the preceding section.

As a final point, the within and between industry distinction regarding spillovers are crucial for what type of policy to pursue since the focus and implication differ to such a large extent. Spillovers in guise of the MAR, Jacobs, or Porter type are all expected to contribute to regional economic growth, but in different ways. The focus on the within industry dimension, in line with MAR and Porter, suggests policies that both spur new firms by reducing entry barriers and support existing concentrations of a certain industry type by stimulating high end niches and spin-offs from existing firms. A Jacobs supporting policy, along the between industry dimension, could target the supply of general human capital and R&D as these measures increase the likelihood of an endogenous generation of new firms and sectors. Development of new
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or emerging industries is a highly risky and uncertain enterprise, therefore the focus should be on general policy measures benefiting a wider range of industries. Despite the risk and uncertainty, policies to promote cooperative activities across firms, in and of itself tie in to research question one in the introduction and the findings in paper [I] of the previous section.

References


Summary


