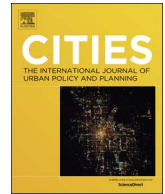


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Services that add value in the city: The rise of the modern economy in Brazil

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ABSTRACT

Recent technological advances have increased the importance of economic activities based on new production techniques with embedded, sophisticated services. In this sense, services offered as intermediate inputs for manufacturing firms that add value in this process constitute one of the main components of productivity gains and economic development. However, such service firms are not homogeneously distributed in space. This paper aims to investigate the spatial distribution of service firms that add value and compare it with the location of service firms that reduce cost. This is done by employing count data models (correcting for the excessive number of zeros whenever necessary) to identify the main factors associated with the location of existing and new firms in these sectors in Brazilian labor market areas. There is also an effort to control for the potential endogeneity of density measures. The main results show that despite the strong linkages with manufacturing, service firms do not necessarily pursue locations close to places that concentrate industrial employment, and they actually avoid to locate in neighboring areas of those who concentrate manufacturing activities. Higher population density, diversity and other measures of economic spatial concentration are much more relevant to determine the location of these firms.

1. Introduction

The world has been seeing significant changes in sector composition over the past decades associated with technological advances and changes in consumption patterns. From the mid-20th century, the incorporation of information technologies and electronics, resulting in production automatization, promoted an escalation of production capacity. Nowadays, a new business model is based on cyber-physical systems, which combine consumer-satisfaction, sustainability, and production to form intelligent network systems and processes (Bloem et al., 2014). These advancements are based on mobile connectivity, artificial intelligence, processing power, and storage capacity (Schwab, 2016).

However, countries are in distinct development stages with different functions in global value chains, whose role in trade has been increasing over the last years. Less developed countries generally supply basic services with lower value added, given that transnational companies outsource lower value-added activities to firms in these areas (UNCTAD, 2013).

In this context, many developing countries are still at earlier stages of development, facing the changes imposed by the third industrial revolution in some industrial sectors. Services gained a significant share in the economy of these regions, and their interaction with manufacturing activities is possible through two main ways (Arbache, 2016). On the one hand, services may be related to production cost reduction

(logistics, IT, and infrastructure, among other types). On the other hand, some services may be directly incorporated by firms and add value to the final products and customized products (R&D, consulting, among other services). Sophisticated goods require a higher share of services that add value to them in their production. Eichengreen and Gupta (2013) identify two waves of service-sector growth, the first related to basic services in countries with low per capita GDP, and the second referring to modern services in developed economies.

This paper aims to shed new light on the main factors that attract firms who provide services that add value to the final manufactured product to specific areas of Brazil. As will be discussed in the following section, this activity is more prone to be economically relevant in developed economies. Moreover, its expansion is associated with a change in a country's position in global value chains. The empirical analysis relates to the literature on the location of high-growth and information and communications technology firms. In the Brazilian case, there are a few studies on firm locational choices, but none focus on the service sector related to value added. The main results show that despite the strong interaction these firms have with manufacturing, their location decision does not seem to be connected to the share of workers in industrial activities.

The same factors that are expected to attract service firms that add value to a specific urban area are also relevant for the emergence of smart cities. Caragliu, Del Bo, and Nijkamp (2011) point out that smart cities are more likely to appear in places with a larger concentration of

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information and communication technology firms, the presence of a creative class, the level of education and the accessibility to new technologies, among other characteristics (see also [Betz, Partridge, & Fallah, 2014](#)). Finally, service firms that add value to manufacturing activities are also more prone to provide new solutions for smart cities. In this sense, understanding their location decision can provide insights for the rise of smart cities.

The empirical strategy followed here is based on count data models, in which the dependent variable refers to the number of existing and new firms in two different service sectors: services that provide cost reduction for manufacturing and services that add value to manufacturing production. Following the literature, five groups of variables are considered in the estimation, allowing the identification of the main processes that are relevant at the local level to attract service firms. There is also an effort to control for potential endogeneity in measures of agglomeration economies, with the inclusion of instruments based on long temporal lags and historically local economic activities.

The main results show that service firms avoid locating close to manufacturing activities, even though they can be intimately related in the structure of economic production. Furthermore, when instruments are in place, urbanization economies are no longer significant in explaining the location of service firms, and diversity remains the most relevant aspect to express agglomeration economies. Some other indirect agglomeration variables capture a large share of this effect (indicator variables for state capitals and presence of airports), reflecting the urban structure of the country in which these administrative regional centers concentrate a significant share of the national economic activity. Thus, the early stages of Brazilian development in more sophisticated services is captured by these results, because only the main urban areas are able to attract firms in this sector. There is also the fact that the continental dimension of the country requires a minimum urban size and structure to allow more productive activities to flourish.

The remainder of this paper is structured as follows. [Section 2](#) reviews the literature on service sector emergence and presents a broad analysis of the empirical literature on firm location decisions. [Section 3](#) describes the empirical strategy, while [Section 4](#) presents the data. [Section 5](#) provides the main results, and [Section 6](#) concludes.

2. Literature review

The growth and dynamics of the service sector can be analyzed through its relationship with manufacturing ([Arbache, 2016](#)). Considering the industrial development path, countries usually advance from an initial high share of agriculture in GDP toward the expansion of basic industries, accompanied by the expansion of general services. Then, economies enter another stage of industrial development in which firms and families demand more sophisticated services (including R&D, financial services, marketing, and engineering). This movement means that the share of manufacturing in GDP starts to decrease, accompanied by an increasing share for services that create value. The changing nature of services is the basis of the third industrial revolution. Services can be ranked according to the value they add to industrial products, as can be seen in [Fig. 1](#).

Production activities that generate more value added are usually located at the home country of multinationals, while low-value-added activities are outsourced to firms in developing economies ([Arbache, 2016](#)). Given the importance of value-added services to the advancement of a country in the industrial development path, it is important to understand the determinants of firms' locational choices within a developing country. Furthermore, there are potential feedback loops in the local development of service and industrial sectors, and the identification of local factors.

A large literature has been developed on the economics and geography of new and existing firms. The analysis is generally concentrated in specific sectors, and recent technological advances have shifted it toward high-growth firms and the high-tech sector. The identification

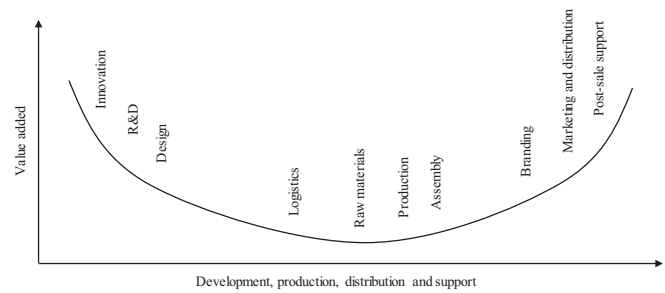


Fig. 1. Smiley curve in manufacturing.

Source: [Arbache \(2016\)](#).

of the main local factors associated with the emergence of these firms is important to provide guidance for innovation and regional economic growth policies ([Li, Goetz, Partridge, & Fleming, 2016](#)). Geographic characteristics, especially local knowledge resources, are relevant not only for the location decision of the firm, but also to its future performance ([Audretsch & Dohse, 2007](#)). In this sense, firms maximize the present value of what may arise from their location decisions. [La Fountain \(2005\)](#) explores the importance of proximity to customers, other firms, and specialized inputs to firms' location decisions.

This subject has been analyzed with different theoretical perspectives. [Arauzo-Carod, Liviano, and Manjón \(2010\)](#) group such approaches into three main categories: (i) neoclassical (profit- or cost-driving factors such as agglomeration economies, technology, and human capital); (ii) institutional (network of economic relations and actions taken by public administration); and (iii) behavioral theories (individual preferences—internal and entrepreneurial characteristics).

Regarding neoclassical factors, the authors show that the literature finds a U-shaped relationship between local attractiveness and the spatial concentration of economic activity. Moreover, urbanization economies are usually more relevant than specialization economies, and service agglomeration economies seem to have a stronger effect than localization economies. Better accessibility to transport infrastructure seems to have a positive impact on the location decision of firms, which tend to avoid areas with higher wages and is attracted to places with a higher level of education.

Among institutional factors, [Arauzo-Carod et al. \(2010\)](#) identify that taxes have an ambiguous effect, environmental regulations move productive resources from polluted areas to clean areas, and incentive programs for new business have mixed effects for the location decision of firms. Finally, behavioral factors are less studied, because it is difficult to find appropriate data, but there is little evidence to suggest that they matter, especially for small firms.

Firm entry in Catalan municipalities is explained by [Liviano and Arauzo-Carod \(2013\)](#) with a set of variables that account for agglomeration economies, economic conditions, spatial effects, human capital, and geographical position. For the location of high-growth firms in the United States, [Li et al. \(2016\)](#) consider similar variables for models of new innovation-based firms, as high-growth firms are relatively new in general. In this sense, one of their references is the model proposed by [Acs, Braunerhjelm, Audretsch, and Carlsson \(2009\)](#) and [Acs and Armington \(2004\)](#) for the location decision of new firms, which is based in knowledge spillovers that arise from entrepreneurship. Once again, the three groups of variables presented by [Arauzo-Carod et al. \(2010\)](#) discussed above serve as the reference for these authors.

According to [Liviano and Arauzo-Carod \(2013\)](#), new and relocated establishments can be analyzed together, because they may be attracted by the same factors to a specific location. However, [Manjón and Arauzo-Carod \(2011\)](#) reach an opposite conclusion. Another result found in the literature is that urban regions with high levels of economic growth and diversity of economic activities attract relatively more opportunity-motivated entrepreneurship ([Bosma & Sternberg, 2014](#)). The relative importance of agglomeration economies'

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