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Targeting Industrial Policy on Business Services:

Rationales and Design for the Case of Chile*

Andrés Madariaga Espinoza†

Abstract

This article explores whether and how targeting industrial policy towards business services (BS) may contribute to economic development in Chile. To do so, the literature on rationales for targeted industrial policy and the relation between BS and economic development is reviewed. I stress that BS potential in economic development depends on productive linkages and associated capacity for generating knowledge and technological spillovers. Then, drawing on Chilean input-output tables for the years 1996 and 2016, an empirical assessment of productive linkages in the tradition of Hirschman is conducted. Three findings stand out from this exercise. First, BS exhibit relatively strong forward linkages and weak backward linkages, thus the sector is generally dependent on intermediate demand. Second, although the magnitude of its forward linkages have decreased, the relative importance of the sector within the domestic economy has increased over the period under study. It is argued that this result is counter-intuitive and affects the capacity of BS to contribute to a beneficial pathway of structural change in the Chilean economy. Third, when breaking down BS into subsectors, the linkages reveal important heterogeneity within the sector. It is suggested that this is relevant for discussing *what* industrial policy should target within BS. Moving forward, considerations for policy design are put forth. Focusing on rationales for intervention and other policy design aspects, the recent experience of industrial policy towards BS in Chile is analysed. Lastly, policy implications associated with the preceding discussion are further illustrated by drawing on the case of offshore services in Costa Rica. By bringing together these elements, the article's main contribution points to the role that productive linkages play in generating beneficial dynamics of economic development associated with BS.

Keywords: business services; industrial policy; economic development; productive linkages; input-output

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1 Introduction and motivation

As the capacity of nation-states to grow prosperous economies is currently facing a number of challenges, a 'renaissance' of industrial policy has surged over recent years (Stiglitz et al., 2013; Savona, 2015). This recent acknowledgement of industrial policy as a crucial tool for economic development has been reflected both in academic scholarship and policy papers by influential economists and practitioners (Cherif and Hasanov, 2019; Rodrik, 2018, 2008; Aghion et al., 2015, 2011; Warwick, 2013). Current discussions on industrial policy have been characterised by reflections on the increasing importance of intangible capital (Haskel and Westlake, 2017; Cano-Kollmann et al., 2018), the advances of potentially labor-disruptive technologies such as artificial intelligence and robotisation (Acemoglu and Restrepo, 2018; Arntz et al., 2016) and the fragmentation of production on a global scale (Baldwin and Lopez-Gonzalez, 2015; Timmer et al., 2014).

Comprehensive policy packages put forward by a number of governments such as the United Kingdom (Industrial Strategy 2017), Germany (High-Tech Strategy 2020), China (Made in China 2025), and South Africa (Industrial Policy Action Plan 2020/21) among others, are adopting an explicit sectoral approach whilst revamping the mission-oriented framework. To a large extent, these initiatives devise a more fundamental role for the state as an actor not to be limited to fixing market-failures nor exclusively concentrating on the so-called 'framework conditions.' (Mazzucato, 2019; Savona, 2018) Quite to the contrary, through these strategies the state is set to actively intervene in markets by promoting particular directions of industrial and technological development (Cantner and Vannuccini, 2018; Mazzucato, 2016).

In the context of emerging economies, debates on the prospects of structural change and sustainable growth related to the tendency of 'deindustrialisation' have also gained momentum (Atolia et al., 2018; Tregenna, 2015, 2014, 2009). Interestingly, the renewed approach devising a rather strategic or 'developmental' state (Wade, 2018), which favours particular sectors and technologies, is in conflict with the policy trajectory followed by most emerging economies under the influence of the 'Washington Consensus' over past decades (Williamson, 2004).

On the one hand, it has been argued that the rise of services associated with the manufacturing decline in output and employment is likely to have negative effects on the growth potential of middle-income economies (McMillan et al., 2017; Rodrik, 2016; Tregenna, 2015). On the other hand, it has been argued that economic specialisation in particular branches of services enable virtuous growth dynamics (Desmarchelier et al., 2013; Kox and Rubalcaba, 2007; Dasgupta and Singh, 2005). Notably, López González et al. (2019) and Di Meglio et al. (2018) have shown that business services (BS) constitute a potential new 'engine of growth.'

In this vein, López González et al. (2019) argues that for emerging economies to benefit from specialising in BS, specific domestic conditions including the presence of backward-linked

industries are a necessary precondition. Nonetheless, the literature has yet to explore the leverage of targeted industrial policies towards BS in generating those conditions, unfolding associated beneficial pathways of structural change and economic development in emerging economies. Hence, this article attempts to shed light on the extent to which BS exhibit potential for economic development and how can the targeting of industrial policy in an emerging economy such as Chile enable such economic development.

The case of Chile as an emerging economy trying to avoid the 'middle-income trap,' (Galeano Hernandez and Gallego Perez, 2018) is of particular relevance for exploring the potential of BS in economic development. Here, diversifying the natural-resource based specialisation pattern in view of long-term growth is considered a crucial challenge (Palma, 2009; Hidalgo et al., 2007). What is more, the rather mediocre performance in terms of economic growth and productivity over the last decade has opened-up the agenda for debating development strategies and targeted industrial policy (OECD, 2018a; Agosin et al., 2010).

Aiming at contributing to the understanding of the role of BS in economic development, I first construct an argument that ties the rationales for targeted interventions and the sectoral features of BS. Then, to show evidence regarding the development potential of the sector, I conduct an empirical assessment of productive linkages. This analysis adds to recent contributions by Freytag and Fricke (2017), Marconi et al. (2016), Bartelme and Gorodnichenko (2015) and Andreosso-O'Callaghan and Yue (2004) following the line of inquiry initiated by Hirschman (1958) on the role of productive linkages in economic development. In light of the emerging evidence, a discussion on the recent policy experience in Chile and Costa Rica illustrates the potential leverage of targeting industrial policy towards BS in the described context. Consequently, as policy implications are drawn from both recent policy experiences and original quantitative evidence, this work adds to the scholarship on industrial policy concerned with services in Chile (García Pérez et al., 2017; Lopez Giral and Muñoz Navia, 2016; Bravo-Ortega and Eterovic, 2015; Zahler et al., 2014a).

The rest of the article proceeds in the following manner. Section 2 reviews the main literature on rationales underlying the selective approach to industrial policy, the relation between BS and economic development, and the recent evidence concerned with productive linkages and economic development. Section 3 describes the relevant context by putting forth the recent economic performance of the Chilean economy in general and of BS in particular. Section 4 outlines the methodological aspects, data and main results of the empirical assessment of productive linkages. Section 5 reviews recent policy experiences in Chile and Costa Rica, discussing design and implementation lessons for targeting BS in the Chilean context. Section 6 concludes emphasising the positive but not conclusive evidence of considering productive linkages in policy design.

2 Targeting business services

The present work focuses on targeting industrial policy towards BS, a sector comprised by professional, scientific, technical and administrative activities, in addition to activities that support general business operations.[1] The construction of the argument for targeted interventions towards BS rests on the following literature review comprised by three subsections. First, the case for targeted industrial policy is presented with a focus on relevant rationales for interventions towards BS. Second, the relevance of BS is further motivated by looking at the literature on the relation between BS and economic development. Third, as the importance of productive linkages for realising BS development potential becomes clearer, further details regarding productive linkages and recent empirical work in this tradition are outlined.

The selective approach to industrial policy

From an historical perspective, industrial policy has been usually associated with targeted policies or state interventions that aimed to promote specific economic sectors (Andreoni et al., 2019; Di Maio, 2014; Owen, 2012). Indeed, highly influential theoretical contributions arguing that productivity-enhancing opportunities are not evenly distributed across economic sectors nor product classes were pioneered by development scholars such as Myrdal, Prebisch, Hirschman and others during the postwar decades (Ocampo et al., 2009)[2]. According to Andreoni (2016), during this 'first wave' of industrial policies, different forms of selective interventions such as national champions promotion, capital flows management and import substitution schemes, were introduced in both emerging and high-income economies.

As the neoclassical counterrevolution took place and the so-called 'Washington Consensus' emerged over the 1980s, the state's leading role in industrial policy was delegitimised and marginalised (Todaro and Smith, 2012). Likewise, scholarship on government failures became preeminent in policy circles, further weakening the base for strong state-led development strategies[3]. As a consequence, minimal market interventions and horizontal (or non-selective) policies focusing on competitiveness promotion and deregulation were massively advocated (Wade, 2018).

To the extent that the free market paradigm is under serious critic and a renewed role for the state to address socio-economic challenges has been mainstreamed (Mazzucato, 2016), the selective approach to industrial policy has seen a 'rejuvenation' over the past decade (Stiglitz et al., 2013). In light of this, the following broad definition of industrial policy is adopted:

[1] For the purposes of this work, BS corresponds to ISIC Rev.4, sections M and N (United Nations, 2008).

[2] See Krugman (1995) for a critical appraisal of this literature.

[3] See for instance the works by Pack and Saggi (2006); Bardhan (1997) and Krueger (1990), among others.

"Industrial policy is any type of intervention or government policy that attempts to improve the business environment or to alter the structure of economic activity towards sectors, technologies or tasks that are expected to offer better prospects for economic growth or societal welfare than would occur in the absence of such intervention" (Warwick, 2013, p.16).

It has been argued that this approach reflects a pragmatic role to industrial policy with a more nuanced scope of action (Rodrik, 2019; John and Tarp, 2017). Indeed, as discussed by Lall (2004), different levels of selectivity are possible: from the national accounts classification (e.g. construction or agriculture), to bundles of related activities (e.g. the life science sector comprised by chemical industries, biotechnology manufacturing and healthcare providers), specific productive activities (e.g. wine production) and technology classes (e.g. solar energy systems). Arguably, this approach makes BS a valid and potentially relevant target for industrial policy.

Moving forward to discussing rationales, the bulk of the literature draws on the *market failures* framework to make a case for policy action (Rodrik, 2008). In a nutshell, market failures refer to the incomplete and imperfect nature of real-life markets rendering sub-optimal allocation of resources. As a result, industrial policy is mainly concerned with 'correcting' the relevant failures and inducing optimal resource allocations. Although sources of failures are variegated (e.g. non-rivalry of goods, externalities, indivisibilities, etc.), agglomeration externalities and knowledge spillovers can be readily associated to targeted industrial policy (Warwick, 2013).

In this vein, Hausmann and Rodrik (2003) argues that uncertain profitability of new economic activities in addition to lack of appropriability leads to suboptimal economic diversification. This is problematic given that higher product diversification positively affects economic growth and productivity (Hausmann et al., 2007). Therefore, given prospects of economic gains, it would be efficient for industrial policy to promote BS associated with emergent knowledge-intensive activities.

Differently, recent contributions in the tradition of *structuralism* argue that specialisation patterns matter because elasticity of demand, knowledge content, and learning opportunities are essentially concentrated in manufacturing (Cimoli and Porcile, 2014). In this view, the *leimotif* of industrial policy is to promote shifts in sectoral composition from the backward sectors (e.g. agriculture) to the dynamic sectors (e.g. manufacturing), where capabilities accumulation are allegedly ubiquitous (Cimoli et al., 2009).

The much discussed Kaldor's growth laws point in a similar direction. According to Kaldor (1966), the growth of GDP is positively correlated with the growth of manufacturing; productivity and output growth are positively correlated in the manufacturing sector (Kaldor-Verdoorn's law); and overall productivity growth is correlated with output growth in the manufacturing sector. More generally, the review conducted by Ciarli and Di Maio (2014) revealed that manufacturing sector has been considered essential for economic development because of increasing returns, technology and spillover effects, high capital intensity, con-

siderations on elasticity of demand, employment potential, and productive linkages.

In other words, due to the outlined sector-specific characteristics of manufacturing, the *structuralism* and related literature make a case for selective policy aimed at strengthening this sector. These contributions hold the commonality that manufacturing constitute a key element for economic development. As it will be further discussed, the BS role in economic development is associated with knowledge and learning possibilities analogous to the ones attributed to manufacturing.

The *innovation systems* scholarship broadened the scope of industrial policy, incorporating the institutional framework within which firms operate in addition to concerns about technological capabilities beyond industries (e.g. universities, public sector, civil society) (Soete, 2007). In this respect, the national systems of innovation framework provided a multi-layered understanding of productive systems, where network relations and interdependencies played a major role in overall economic efficiency. Indeed, Nelson (1993) shows that actors interact across economic activities and geographic zones in distinct ways, which links to sectoral and technological policies enabling national industries to stay ahead or catch-up technologically through differentiated innovation and learning processes.

Here, Castellacci (2008) bridges the framework on sectoral patterns of innovation and the innovative efforts of different types of services. Indeed, by putting forth a typology that builds from Pavitt's taxonomy (1984), it is suggested that the interaction between technologically advanced manufacturing and knowledge-provider services (e.g. BS), sustains the innovation processes in other sectors of the economy. In this argument, by supporting knowledge transfer, industrial policy plays a crucial role in inducing supplier-producers interactions that leads to enhanced economic performance (Castellacci, 2008, p.992). In other words, policy aimed at supporting BS such as acquisition of advanced machinery services, hiring software consultancy or engineering services, contributes to higher innovation rates with the potential to generate productivity gains.

Another rationale for targeted industrial policy are the *coordination problems*. Drawing from the Rosenstein-Rodan's 'big-push' theory (1943), Murphy et al. (1989) show that when industrial activities are characterised by economies of scale, investing in several industries in a coordinated manner might be necessary for profitability. In a similar vein, Rodrik (1996) argues that coordination failures arise as firms investment and production decisions in the upstream and downstream side of a given industry are taken independently but depend on each other via intermediate demand.

According to Rodriguez-Clare (1996), complementarities can also be understood as a situation in which a firm innovates (e.g. adopts a new technology, introduces a new product) that requires the demand for inputs, either goods or services, produced by other firms. In this situation, obstacles to innovation and/or trade may result in lack of specialised inputs and limited complementary demand, which in turn explains the underdevelopment of technologically intensive activities. Thus, from the perspective of selective industrial policy, interventions aiming at fostering intermediate demand between specific sectors would be

efficient.

To sum up, industrial policy encompasses different approaches and its understanding has evolved over time. The selective approach was essential in the 'first wave' of industrial policy, but was later deemed problematic in view of several difficulties associated with state interventions and the dominance of the free-market paradigm. More recently, a pragmatic approach on industrial policy rebooting some of the principles of selective interventions is back in the agenda. In this respect, different streams of the literature including *market failures*, *structuralism*, *innovation systems* and the *coordination problems*, provide cases for pushing forward targeted interventions.

Focusing on rationales particularly relevant for the issue at hand, the *coordination problems* and the role of intermediate demand drives this paper's argument at large. As will be further discussed, BS essentially depends on intermediate demand from other industries constituting a forward-linked activity in the sense of Hirschman. Consequently, addressing sectoral interdependencies and complementarities through industrial policy seems crucial for the development of BS and the realisation of related profitable economic activities.

In addition, *market failures* related to entrepreneurial discovery and information externalities seem to be pervasive in knowledge-intense activities such as BS. Moreover, although the broadly defined *structuralist* tradition explicitly favours manufacturing, knowledge content and accumulation of capabilities that generates productivity gains also provide a case for targeting BS and other dynamic sectors. Lastly, drawing on *innovation systems*, as different actors, learning processes and technological regimes shape the environment on which BS firms operate, the importance of BS sectoral patterns of innovation also points to devising targeted interventions.

We now turn to discuss the extent to which the BS sector is conducive to economic development and the role of productive linkages in this process.

Business services and economic development

This subsection surveys theoretical and empirical evidence on the relation between BS and economic development. After tracing back the usual but increasingly questioned negative association between services and economic performance, contributions indicating that BS enhance economic development are outlined. The main insight emerging from this survey is that the relation between BS and economic growth is not direct, and that to a large extent, productive linkages influence the prospect of economic growth associated with BS in emerging economies.

The negative association between services and economic development dates back to Singh (1977) and in recent years it has been reprised with considerable attention (McMillan et al., 2017; Rodrik, 2008). These concerns owe greatly to Baumol's argument on services suffering from the so-called 'cost disease' (Baumol, 1967, 2012). Generally speaking, this line of

inquiry is worried with the potentially negative economic effects resulting from the rising share of services at the expense of declining importance of manufacturing.

The cost disease hypothesis has been supported by various empirical assessments and its generally accepted by the economic discipline. According to A.Young, "[d]ecades of data on productivity growth in goods and services have confirmed Baumol's thesis, turning it, for all intents and purposes, into a stylized fact of economic growth" (Young, 2014, p.3635). To take an example, Nordhaus (2008) conducts econometric analysis drawing on U.S. industry data for the 1948-2001 period, concluding that sectoral shifts toward services have significantly dragged down aggregated productivity growth.

However, Gallouj and Savona (2009) argue that this conventional wisdom does not take into account mis-measurament of services productivity and thus neglects its contributions to innovation. Indeed, a considerable amount of scholarship fundamentally challenges the services as a burden perspective. Empirical evidence on the positive effects of services over growth and structural change is plentiful (Di Meglio et al., 2018; Evangelista et al., 2015, 2013; Kox and Rubalcaba, 2007; Lorentz and Savona, 2008; Peneder et al., 2003) and novel theoretical contributions show how BS can emerge as a factor of long-term growth (Desmarchelier et al., 2013).

What is more, Wu and Baumol (2012) have also recently argued that BS should be treated as a particular case in which the cost disease does not hold true. In this respect, Oulton (2001) shows both analytically and intuitively that as long as the productivity rate in the service sector is above zero, factor reallocation into services that produce for other dynamic sectors' intermediate demand can actually raise overall economic growth. In a similar vein, Tripplet and Bosworth (2006) claim that Baumol's disease 'has been cured,' as their empirical work brings evidence on the positive productivity effects attributed to information technology (IT) services over the 1990s in the U.S economy.

Likewise, by showing that services have been a key sector in the Indian experience, Dasgupta and Singh (2005, 2006) dispute the extent to which manufacturing activities hold an exclusive role in economic development. More concretely, the authors suggest that the dynamism experienced by IT services led to the expansion of manufacturing activities rather than the other way around (Dasgupta and Singh, 2005, p.1055). Furthermore, they argue that although specific patterns of deindustrialisation might be 'harmful' for emerging economies, as long as certain services show dynamic features in the sense of Kaldor, they make a positive contribution to economic development (Dasgupta and Singh, 2006).

In this vein, Felipe et al. (2009) show that in the context of emerging economies in East Asia, both manufacturing and services explained productivity growth associated with technological spillovers. These authors claim that "there is no reason to believe that, in the medium run, growth will decline due to the increase in the share of services in total ouput" (Felipe et al., 2009, p.129).

The work by Kox and Rubalcaba (2007) also points to this direction. Their empirical ev-

idence show that BS contribution to aggregate economic growth in the EU was decidedly positive in the 1980-1990 period and moderately so in the mid-1990s onwards. Moreover, the authors suggest that BS have raised the productivity of other industries through three different mechanisms: knowledge and technological spillovers in the form of original innovations, knowledge diffusion and the reduction of human capital indivisibilities (Kox and Rubalcaba, 2007, p.86).

Similarly, Di Meglio et al. (2018) provide an empirical assessment of Kaldor's laws for a number of countries from different macro geographical zones including Africa, Asia and Latin America. Their findings suggests that "i) services may be subject to increasing returns, and ii) the same Kaldorian mechanisms which makes manufacturing the engine of growth may also apply to services" (Di Meglio et al., 2018, p. 1506). Consequently, certain patterns of structural change characterised by deindustrialisation might not hamper economic prospects and in fact, BS can be regarded as an additional 'engine of growth.'

Following this evidence, the present work concurs with the idea that both manufacturing and BS can be key enablers of economic development. Interestingly, the econometric approach of Evangelista et al. (2015) supports that BS inputs have a positive effect on the international competitiveness (e.g. export shares) of manufacturing industries in the EU. This result puts forward the trade dimension of BS prospects for economic development and, by taking into account different user sectors and sources of competitiveness, adds to the understanding of BS as an heterogeneous sector.

On the latter, Miozzo and Soete (2001) developed a technological taxonomy of services showing that human capital requirements, innovation capacity, exposure to trade and interconnectedness to the rest of the economy varies greatly between services. In the context of increasing trade in services in global value chains (GVC) (Francois and Hoekman, 2010), and given a positive relation between trade and economic development (Frankel and Romer, 1999), the high tradability of BS becomes particularly relevant for emerging economies (Miroudot and Cadestin, 2017).

According to Baldwin (2011), the intensive use of digital technologies enables the international fragmentation of the production processes, making the coordination of BS and IT services a defining feature of GVCs. In this respect, López González et al. (2019) have put forth the *Linder-Hirschman hypothesis* (LHH) suggesting that only under certain conditions BS spur growth by enabling effective engagement in GVCs. Specifically, they argue that domestic presence in BS backward-linked industries and the existence of a representative manufacturing sector are a necessary precondition for emerging economies to gainfully insert themselves in GVCs.

The interplay between domestic conditions and BS economic effects in emerging economies has been further explored by Bontadini and Savona (2019). Drawing on the LHH, they show that natural resource industries (NRI) constitute an important source of backward-linked demand for BS. Moreover, these authors suggest that NRIs intermediate demand fosters exports of knowledge-intensive BS. Arguably, this result opens-up space for industrial policy

to intervene and stimulate the backward-linked demand of BS.

In sum, although economic development has been traditionally seen as an manufacturing-led process, BS exhibit crucial features that challenges this view. As shown notably by Di Meglio et al. (2018), there is evidence indicating a positive relation between economic growth and BS in emerging economies. Moreover, this positive relation between BS and economic development is contingent on domestic factors, among which the interconnectedness with other sectors (e.g. productive linkages) is of the utmost importance for realising knowledge and technological spillovers conducive to economic gains.

A qualification and further evidence regarding the role of productive linkages in economic development are provided in the following subsection.

The role of productive linkages

In modern economic analysis, the interdependence in terms of input and output provision and demand – productive linkages – dates back to the major contributions by Leontief (1951, 1953). Following this thread, crucial work in measuring linkages and analysing the economic effects of the presence and absence of them, were made by Rasmussen (1956), Chenery and Watanabe (1958) and Hirschman (1958). Focusing on Hirschman's model of unbalanced growth (1958, ch. 4), the type and magnitude of linkages were claimed to be central in explaining poor economic performance, emphasising that activities characterised by strong linkages were crucial for economic development. In this scholarship, these activities are referred to as 'key sectors.'

According to Hirschman's 'unbalanced growth', economic development is seen as the sequencial process of demand and supply disequilibria in which "increased production of A will lead to *pressure* for increasing the available supply of B" (Hirschman, 1958, p.68)[4]. To a large extent, the crucial problem in development theory and policy is how to maximise the induced effect by planning and incentivising efficient sequences of investments (Hirschman, 1958, pp.76; 98).

Specifically, Hirschman distinguished two types of linkages. On one hand, the *backward linkage effect* also referred to as the input-provision or derived demand, which represents "the induced attempts to supply through domestic production the inputs needed" into other economic activities (Hirschman, 1958, p.100). On the other hand, the *forward linkage effect* defined as "the induced attempts to utilise one's outputs as inputs in some new activities" (ibid), which referred to one sector's output utilisation as input for the production of other sectors (e.g. intermediate demand).

More recently, empirical work on linkages have been revisited in the context of emerging economies. Aiming at identifying 'key sectors' in China over the 1987 - 1997 period when substantial structural transformations took place, Andreosso-O'Callaghan and Yue (2004)

[4]Italics as in original text

quantifies total linkage effects and uses hypothetical extraction methods. Their findings suggest that agriculture, a subset of manufacturing industries, and services, exhibited increasing sectoral interdependence which paralleled high economic growth rates.

Similarly, Marconi et al. (2016) analyses linkages for the case of Brazil over the 2000-2009 period. Their findings suggests that although agricultural and mineral commodities enjoyed rapid growth during the mentioned period, these sectors show low linkage indices. At the same time, although manufacturing exhibited the highest linkage effects, its slow paced growth over the period hindered the possibilities of structural change and long-term growth.

From a cross-country perspective, Bartelme and Gorodnichenko (2015) use extensive input-output panel data comprised of 91 countries over 50 years, estimating the relation between linkages and productivity. By means of econometric analysis, the authors suggest that there is a strong positive relation between inter-industry linkages and aggregate productivity. Nonetheless, the effect is found to be heterogeneous: in richer countries economic growth is positively correlated with stronger linkages, whereas in poorer countries non-significant correlation is reported. The authors conclude that distorted markets of inputs and less intermediate-intensive production techniques results in worsened productivity in poorer countries.

Focusing on the sectoral linkages of service activities, Freytag and Fricke (2017) conduct an empirical assessment of Nigeria and Kenya. In the case of Nigeria the authors examine the linkages of finance, communication services and BS, while in the case of Kenya, the assessed sectors include finance, insurance, and real state (aggregatedly) in addition to the communication services. Their findings are described as mixed: the financial and BS sector in Nigeria exhibit high forward and backward linkages, whereas in the case of Kenya, financial intermediation is characterised by weak productive linkages. It is suggested that market conditions and institutional features are relevant in explaining the differences in character and magnitude of productive linkages. Nonetheless, the authors acknowledge that the sectoral levels of aggregation and differences in classification between the countries hinders direct comparison of results, and that assessment of linkages on finer grained data is encouraged (Freytag and Fricke, 2017, p.41).

In the case of Chile, productive linkages have been analysed with a focus on the mining sector. Using the input-output table of 2012, Correa Mautz (2016) shows that in spite of the prominence of mining activities in the Chilean economy in terms of exports, the sector exhibits extremely weak backward and forward linkages. Furthermore, in light of this deficient linkages between mining suppliers and other economic activities, Correa Mautz (2016) argues that technological spillovers of mining related knowledge-intensive services studied elsewhere by Urzúa (2011) are underdeveloped. This evidence will be reprised in the following empirical assessment.

Summing up, the importance of productive linkages in economic development is well-established in the theoretical literature following the vein of Hirschman. However, as avail-

able empirical evidence for emerging economies is rather heterogeneous, domestic conditions in general and productive linkages in particular, constitute a relevant line of inquiry to assess BS potential for economic development. In the specific case of Chile, BS productive linkages have not been examined as yet.

Moreover, as it is of interest to examine whether targeted interventions towards BS can enable such economic development in Chile, it becomes relevant for our argument to tie the role of linkages with actual policy experiences. Here, to the extent that selective industrial policy enabled the development of BS in the case of Costa Rica (Monge-González and Tacsir, 2014), by drawing on a brief policy analysis of Costa Rica and Chile, potential lessons for targeting BS in the case of Chile are later discussed in the policy section.

To provide further context to the empirical application outlined in the following section, the recent performance of the Chilean economy with a focus on BS is outlined through economic data.

3 The Chilean economy and the business services

Over the past two decades, the structure of the Chilean economy has progressively shifted in favour of service activities. Taking into account the social and personal services, real state activities, finance and business services, transport and communication, and wholesale and retail trade, the combined share of services in the Chilean economy has increased from 46% in 1996 to nearly 60% of the gross domestic product (GDP) in 2018 (Central Bank of Chile, 2019).

In this context, the evolution of the finance and business services sector has markedly outperformed the rest of the economy over the mentioned period. As shown by Figure 1, since the early 2000s the overall economy has doubled its size whilst the combined share of finance and business services has grown by more than 4 times in terms of value added. Consequently, the participation of the sector in total output has doubled over the last two decades. Indeed, the sector represented 8.33% of total value added in 1996 and rose to 16.38% by 2018 (Central Bank of Chile, 2019).

Interestingly, when the financial sector and BS are analysed separately, a noticeable divergence between both activities is revealed. As shown by Figure 2, the financial sector represents nearly 4% of total output, a figure that remains roughly unaltered over the period. On the other hand, BS have experienced a considerable increase in their share of value added, from nearly 6.7% in 1996 to more than 11% by 2016. It is worth noting that this expansion experienced by BS is unparalleled by other sectors.

Conversely, the performance of the manufacturing sector is particularly negative over the same period. Indeed, the manufacturing sector accounted for more than 17% in 1996, but by the year 2016 it represented just about 11% of total value added. This suggests that, at least in terms of value added, Chile has experienced a process of deindustrialisation over

the past two decades.

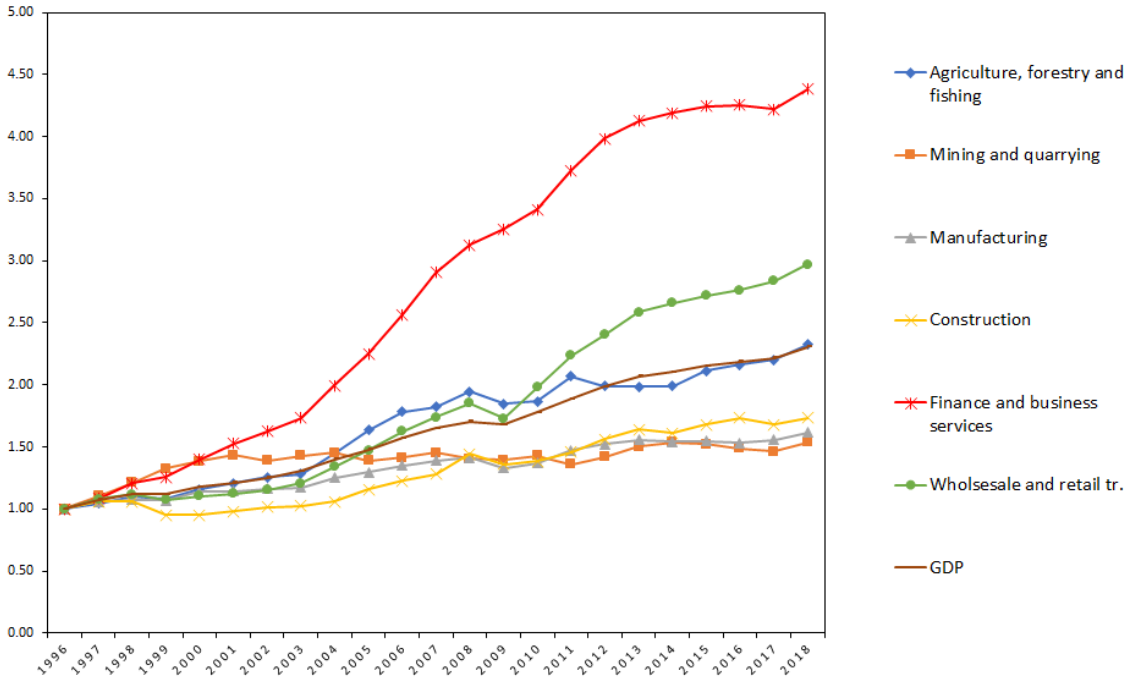
In this vein, Castillo and Neto (2016) argue that Chile has experienced 'premature deindustrialisation,' meaning a decrease in terms of both manufacturing output and employment at an early phase of its industrial development. Furthermore, the authors show that this trend has been accompanied by an increase in natural-resource intensive exports and an increasing share of services (Castillo and Neto, 2016, p.23). Indeed, Figure 2 suggests that the declining trend followed by the manufacturing sector share of output has a counterpart in BS as well as in other activities.

In spite of the increase in natural-resource exports, the observed performance of the copper mining activities is rather mixed. As shown by Figure 2, there is a marked increase in the share of value added of copper mining activities from 1996 to 2008, more than doubling its participation from nearly 6% to 14% approximately. Nonetheless, over the subsequent decade this trend was reversed and by 2016 the copper mining activities represented nearly 8% of the total value added. On average, the sector represented 9.22% of the GDP in 1996-2016.

On this regard, two additional observations are necessary. First, the period under consid-

Figure 1: Index of value added by industry

Level of 1996 = 1.00

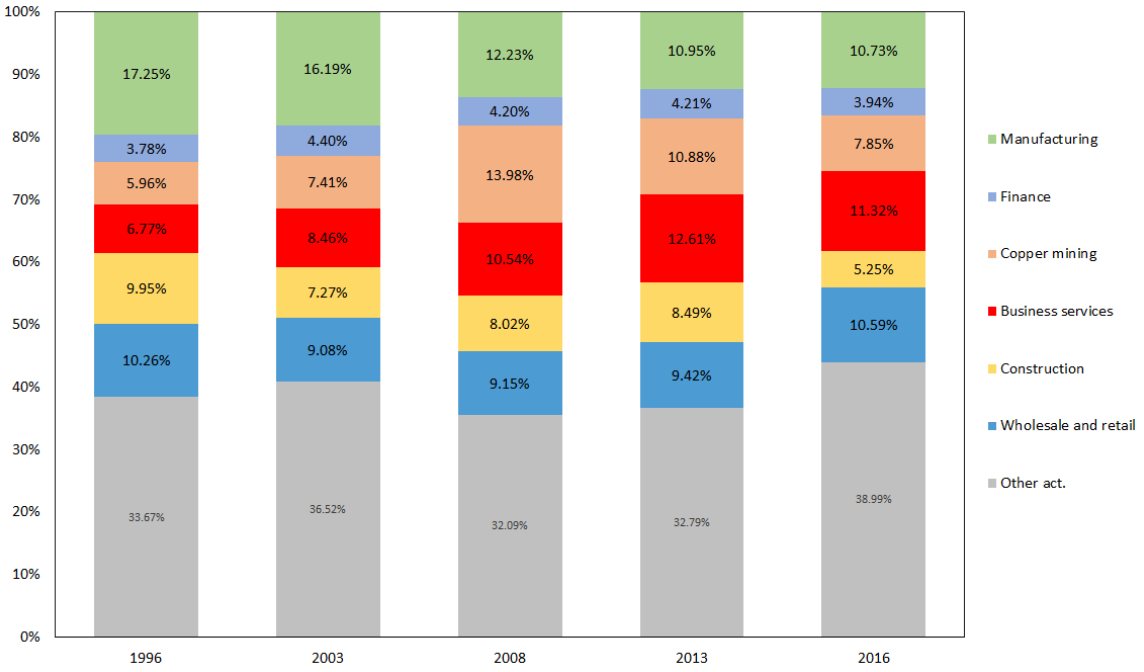


Source: Own elaboration based on Central Bank of Chile data: chained volume series, year of reference 2013.

eration coincides with the commodity boom cycle that characterised the first decade of the 2000s, thus this performance might be reflecting the changing conditions of international markets (Gruss, 2014). Second, the performance of BS and the copper mining industry appear to be moving in tandem. Although this conjecture should be assessed with appropriate methods, the tendency suggest that further exploration of the relation between both sectors is pertinent. Indeed, the assessment of productive linkages provided in the subsequent section will shed further light on the interconnectedness of mining activities, BS and other sectors.

Other interesting trends in sectoral composition of service activities showed by Figure 2 are as follows. The construction sector has decreased considerably from nearly 10% in 1996 to just over 5% of total value added by 2016. As per the wholesale and retail trade, its share of output has remained rougly unchanged, accounting for approximately 10% at the beggining and end of the period.

Figure 2: Share of value added, selected sectors



Source: Own elaboration based on Input-Output tables. Further details provided in section 4.

Moving into trade performance, a rather different picture emerges and it seems that services did not experienced major changes. According to the Atlas of Economic Complexity (Harvard Growth Lab, 2019), the majority of Chilean exports by value were fundamentally derived from the primary sector: metals and mining products (48% of gross exports) and agriculture products (30% of gross exports). Concerning services aggregatedly, the sector accounted for 19.56% of gross exports in 1998 and 12.3% by 2017. In a more dissagregated

manner, gross exports of services in 2017 where comprised of insurance and finance (5%,), ICT (30%), transport (29%), and travel and tourism activities (36%).

However, these figures should be taken with caution. It has been shown that to a large extent BS are increasingly exported as embodied in other products (Miroudot and Cadestin, 2017). That is, since BS serve intermediate demand rather than final demand products, their contribution to exports is usually larger when assessed in terms of source of value-added embodied in final products. Although fine grained data on this regard are rather limited, the Trade in Value Added database (OECD, 2018b) suggests that domestic value added content of Chilean gross exports accounted for 20% on average over the 2005-2015 period.

With respect to innovation and trade performance of service activities, Zahler et al. (2014b) conducted an econometric analysis at the firm-level covering the 2005-2006 period. The authors find that Chilean tradable service firms exhibit a higher 'skill premium' than manufacturing firms; these tradable service firms appears to be "as innovative as manufacturing in terms of inputs and outputs" (Zahler et al., 2014b, p.954), and that exporting service frims show a higher propensity to innovate than manufacturing firms. Moreover, the authors show that services have received 60% of total foreign direct investment flowing to the country over the 2000s and 70% of the foreign investment by Chilean firms has been allocated to the service sector (Zahler et al., 2014b).

Along the same line, Álvarez et al. (2015) further characterises the performance of innovative service firms by analysing traditional services separated from knowledge-intensive services. The main findings of this work show that the public financial support for the intensity of innovation, and the role of cooperation between firms is stronger in knowledge-intensive services than in traditional services. These results portray BS-related activities as a source of economic dynamism.

In sum, this brief descriptive analysis suggests that BS constitute an increasingly relevant sector in the Chilean economy. This is notably reflected by their growth in value added and the increasing share of output. Although trade data does not fully capture this expansion, econometric evidence shows encouraging performance when considering the interplay between trade and innovation.

In order to elucidate the extent to which can targeting industrial policy towards BS contribute to economic development in Chile, the productive linkages of BS over the 1996-2016 period are empirically assessed. Concretely, the following questions are examined:

- What type of linkages characterise the BS? Is this pattern of linkages different from other services?
- Has the relative importance of the BS linkages changed over the period?
- Is there evidence of heterogeneity within the BS?

4 Productive linkages of business services in Chile

As discussed in preceding sections, the literature argues that the extent to which BS enhances economic development is closely related to other sectors intermediate demand. The present empirical assessment identifies and classifies the productive linkages of the Chilean economic sectors with a special focus on BS. This assessment is conducted in the following manner. First, methodological aspects and specifics on data at hand are provided. Second, results are presented and discussed in connection to relevant evidence as outlined in the literature review. In a nutshell, the findings suggest that (i) BS are dependent on inter-industry demand, (ii) BS have expanded without enhancing productive linkages, and (iii) BS are heterogeneous activities. I contend that these findings points to the need of policy intervention in order to effectively harness prospects of economic development related to BS.

Methodological aspects and data

To derive the analytic form of the productive linkages that allows the empirical assessment, this work follows the formulation and nomenclature put forth by Miller and Blair (2009). The point of departure is the standard mathematical representation of the input-output model of an economy composed by n economic activities. In matrix form that is,

$$x = f + Z\iota \tag{1}$$

where $x = (x_1, ..., x_n)'$ is a column vector representing output of each of the n sectors; $f = (f_1, ..., f_n)'$ is a column vector representing the final demand of each sector, including both local components (consumption, investment and government consumption) and foreign demand (exports), which for the purpose of this exercise remains determined exogenously. The elements of the matrix $Z = |z_{ij}|$, represent the inter-industry sales by sector i to the other j sectors; and ι is a column vector of dimension n whose elements are all equal to one. It is worth noting that the multiplication of both elements creates a column vector whose elements are the row sums of Z. In other words, the equation (1) simply represents that the output of sectors (x) go either to final demand (f) or intermediate demand of other sectors (Z).

Furthermore, in input-output analysis the ratio between the output of sector j to the input from sector i required for production forms the well-known technical coefficient (a_{ij}). Assuming a production function of fixed proportions (Miller and Blair, 2009), the technical coefficient is given by $a_{ij} = z_{ij}/x_j$. By using basic operations of matrix algebra, replacing $z_{ij} = a_{ij}x_j$ in equation (1) and grouping the set of technical coefficient in matrix A, the following relation can be derived,

$$x = (I - A)^{-1} f \tag{2}$$

where I is the n x n identity matrix and $(I - A)^{-1}$ is the Leontief inverse matrix ($L = |l_{ij}|$), whose elements ($l_{ij} = 1 - a_{ij}$) represent the relation between the gross output of each sector

(x) and the final demand (f). Indeed, equation (2) is also referred to as the demand-driven model.

Alternatively, the early work by Ghosh (1958) instead of deriving a relation between final demand and output, presented the input-output model from the perspective of the supply. That is, the requirements of producing one sector's output can be reflected in the allocation coefficients ($b_{ij} = z_{ij}/x_i$) which simply represents the relation between the output of sector i and the purchases of i made by the other j sectors. By arranging these elements in a matrix (B) and applying an analogous algebraic transformation, the (supply) input-output model is now given by,

$$x' = v'(I - B)^{-1} \tag{3}$$

where x' is the transposed column vector of outputs for the n sectors; $v' = (v_1, ..., v_n)$ is a column vector of primary inputs and; $(I - B)^{-1}$ is the Ghosh inverse matrix ($G = |g_{ij}|$) whose g_{ij} elements are the equivalent to the fixed relation between the output of sector i and the inputs required for its production coming from the j other sectors.

Drawing on these foundations of input-output analysis, inter-sector linkages that characterises each of the n sectors can be derived. Once again, following Miller and Blair (2009), the *total backward linkage* accounting for the linkage effects (including intra-sector transactions) correspond to the column sum of the Leontief inverse matrix (3). These linkages are normalised by accounting for the average strength of the linkages in the economy (4) and thus, the relatively backward-dependent sectors can be identified as the ones with backward linkage value above the average ($\overline{BL}_j > 1$). That is,

$$BL_j = \sum_{i=1}^{n} l_{ij} \tag{4}$$

$$\overline{BL}_j = \frac{BL_j}{1/n \sum_{i=1}^{n} BL_j} \tag{5}$$

The *total forward linkages* is calculated analogously. In this case, the row sum of the elements of the Ghosh inverse matrix are used. Accordingly, the normalised form allows the identification of relatively forward-dependent sectors as the ones with forward linkage above the average ($\overline{FL}_j > 1$). That is,

$$FL_j = \sum_{i=1}^{n} g_{ij} \tag{6}$$

$$\overline{FL}_j = \frac{FL_j}{1/n \sum_{i=1}^{n} FL_j} \tag{7}$$

It is worth noting that although earlier measures of the forward linkage effect were also based on the Leontief inverse, the Ghosh model was later deemed more appropriate because

of its economic interpretation. In particular, as discussed in Jones (1976), while the demand approach starts at the end of the production process tracing back its effects through the economy using the Leontieff inverse, the production approach (Ghosh matrix) starts from changes in the most basic inputs, tracing its effect through user industries that react to that changing supply of inputs.

As proposed by Miller and Blair (2009), the sectors can be classified into four categories depending on the value of its normalised linkages in the following manner: I) *Generally independent* if the sector's forward and backward linkages are below the unity; II) *Dependent on interindustry demand* if the sector's forward linkage is high, but its backward linkage is low; III) *Dependent of interindustry supply* if the sector's forward linkage is low but its backward linkage is high; and IV) *Generally dependent* if the sector's forward and backward linkage is above the unity. This classification or typology is summarised in Table 1.

Table 1: Classification of backward and forward linkages

		Forward linkage	
		$Low < 1$	$High > 1$
Backward linkage	$Low < 1$	I. Generally independent	II. Dependent on inter-industry demand
	$High > 1$	IV. Dependent of inter-industry supply	III. Generally dependent

Source: Taken from Miller and Blair (2009).

Now, to empirically quantify the forward and backward linkages that characterises BS in Chile, the domestic input-output tables for the years 1996 and 2016 are used. This time period is the longest possible considering publicly available official data released by the Central Bank of Chile.[5] Furthermore, the data at hand is remarkably fine grained, for the year 1996 the input-output table considers 73 sectors, whereas for the year 2016 the table comprises 111 sectors. Both input-output tables show transaction flows, gross output, intermediate consumption and value-added at basic prices.

In terms of aggregation level in the sector of interest, the input-output table of 1996 only covers business services aggregatedly. In the case of the input-output table of 2016, it is possible to breakdown BS in different subsectors. Namely, separate data is available for legal and accounting activities; architectural and engineering activities; professional, scientific and technical activities; rental and leasing activities and; other business support and administrative activities. A summary of the main features of the used data is reported in Table 2.

[5] As the 1986 input-output table is only available in physical copy at the Central Bank of Chile Library in Santiago, it was not possible to use it for the present article.

Table 2: Data summary

	Input-Output 1996	Input-Output 2016
No. of sectors	73	111
Sectoral detail	Business services	Business services
		Legal and accounting;
		Architectural and engineering act.;
	n/a	Professional, scientific and technical act.;
		Rental and leasing act.;
		Other support and administrative act.
Codification:		
– *Central Bank of Chile*	65	96,97,98,99,100,101
– *ISIC Rev.4**	M, N	69,71,72,74,77,82

*: Code equivalence based on United Nations (2008).

Coming back to the questions outlined in the preceding section, the empirical assessment is presented in the following manner. First, for each input-output table, a visualisation and description of the productive linkages that characterises BS in relation to other economic activities is put forth. This pattern of linkages is discussed in accordance to the typology presented in Table 1. Second, changes in the relative importance of the estimated linkages are assessed. This comparison provides insights into the extent to which the previously documented growth in relative importance experienced by the BS in the Chilean economy is also reflected by strengthened linkages. Lastly, focusing on the input-output table of 2016, the linkages of BS subsectors are assessed in a disaggregated manner. As it will be discussed, the breakdown of BS provides evidence on the high heterogeneity within the sector.[6]

Results

The Figures 3 and 4 show the normalised forward and backward linkages for the years 1996 and 2016. The y-axis correspond to the forward linkage effect, reflecting the extent to which a given sector serves as input supplier for the rest of the economy; while the x-axis correspond to the backward linkage effect, reflecting the extent to which a given sector demands inputs from other sectors in order to produce its output. Additionally, for both figures a solid line at the unit is depicted, dividing the plots into four quadrants. Hence, a

[6]The analysis was performed using the 'ioanaylsis' package (Sarmiento-Barbieri and Wade, 2019), available for *R* software and obtained from CRAN repository. Further documentation on this regard is provided in Nazara et al. (2003). Original dataset and routines used for calculation are available upon request.

visual representation of the linkage-based sectoral typology outlined in Table 1 is provided.

(*i*) *BS are dependent on inter-industry demand*

As shown by Figure 3, in 1996 BS were located in the upper-left quadrant, exhibiting relatively low levels of backward linkages and high levels of forward linkages. In other words, BS was a sector highly dependent on inter-industry demand in 1996 (type II in Table 1). Although this is a rather unsurprising result, it is important for two reasons. First, this finding confirms that the Chilean BS exhibits sector-specific characteristics in line with the ones discussed in the reviewed literature; and second, this finding provides the baseline for subsequent comparisons between the relative importance of BS forward linkages with respect to other sectors in the economy and potential changes over time.

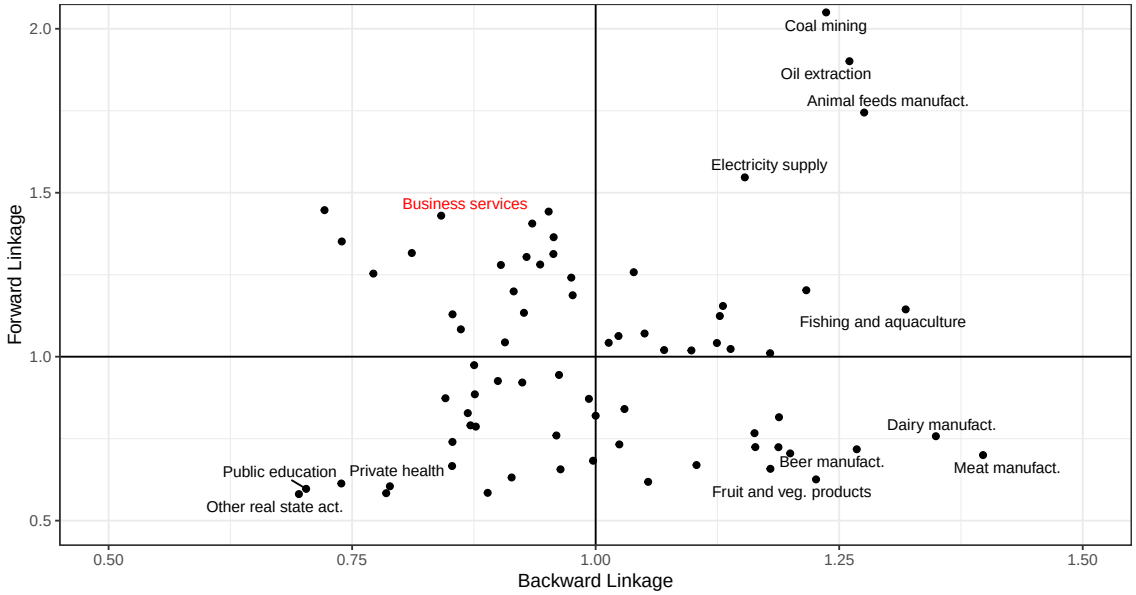
Regarding the first point, sector specific characteristics of BS, it is clear that other types of services such as private health or education exhibit a very different pattern of interconnectedness to the rest of the economy. Namely, the personal services are located in the lower-left quadrant, showing low levels of backward and forward linkages. According to the outlined classification, they can be characterised as generally independent sectors (type I). Thus, this adds to the intuition that meaningful debate on the implications of 'tertiarisation' should refer to the role of particular services - BS, IT, and so on - separately, rather than speaking of 'the tertiary sector' or 'services' in a broad sense.

As per the upper-right quadrant, exhibiting high levels of both forward and backward linkages the following sectors are found: coal mining, oil extraction, animal feeds manufacturing and electricity supply. These economic sectors can be characterised as generally dependent (type III), as they largely rely on inputs to produce output and, at the same time, they supply to inter-industry demand serving as inputs for the production in other sectors. As mentioned, the activities exhibiting this pattern of linkages were considered as 'key sectors' for economic development in the tradition of Hirschman (1958). An interesting venue for further investigation relates to sustainability issues of focusing investment on these 'key sectors' and its implications for development strategies.

In the lower-right quadrant, the sectors exhibiting high levels of backward linkages and low levels of forward linkages are localised. These sectors correspond to the type III classification, as they depend substantially on inter-industry supply from other sectors. It is found that manufacturing activities that belong to the food and beverages industry such as meat manufacturing, dairy manufacturing, beer manufacturing and other fruit and vegetable products follow this pattern. This result can be associated with the natural-resource intensity involved in food manufacturing industries, which naturally demand resources from primary economic activities.

An analogous plot for the year 2016 is shown by Figure 4. Interestingly, the general pattern of linkages seem to have experienced important changes. Differently from 1996, the center of the figure which represents the average backward linkage effect across sectors has been displaced towards the left. Accordingly, backward linkages appear to be more skewed,

Figure 3: Hirschman Forward and Backward Linkages – 1996



Source: Own elaboration based on described methodology and Input-Output data of 1996

where few sectors show large values of backward linkages and thus acquired high relevance in demanding output from other sectors.

Indeed, in the lower-right quadrant, showing high backward and low forward linkages the following sectors are found: meat and fish manufactures, aquaculture, electricity distribution and construction. Notably, the maximum value of the normalised backward linkage increased from 1.4 in year 1996 to 2.2 in 2016 approximately. I find these results coherent with the increased specialisation in commodities and natural resource based manufactures which has been documented elsewhere, notably by Castillo and Neto (2016).

In the upper-right quadrant, showing high-levels of forward and backward linkages, there are considerably less sectors than in 1996. The sectors that were previously identified as leaders in this respect (e.g. oil extraction, coal mining) seem to have substantially reduced the magnitude of their backward linkage and are now located in the upper-left quadrant. Arguably, the decreased importance in this extractive industries can be partially associated with the evolution of the energy matrix towards renewables over the last decade (Nasirov and Silva, 2014) and the long-standing decline in the Chilean petroleum production (Agostini and Saavedra, 2009).

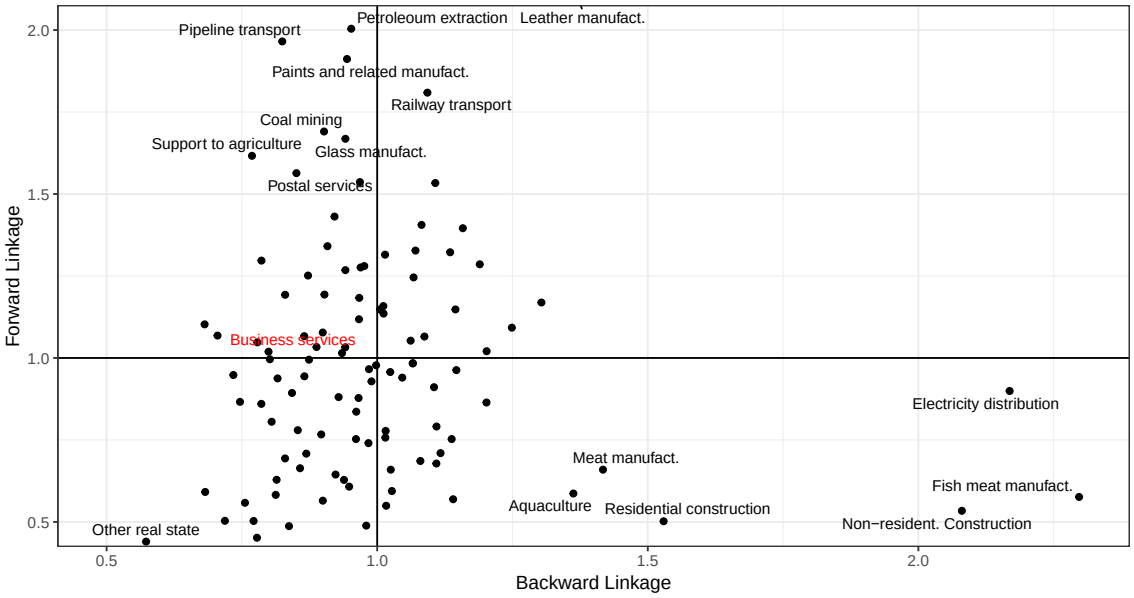
In parallel, small sectors in terms of share of output such as railway transport (0.05%) and leather manufacturing (0.01%) are now the leaders in terms of linkages showing high degree of both forward and backward linkages. This result is worrisome insofar as it reflects the lack of key sectors that can potentially serves as anchor for development in the vein of the

unbalanced growth theory by Hirschman (1958). However, at this point the interpretation of this result remains a conjecture and should be further investigated.

Regarding the lower-left quadrant, real state activities and other personal services are found to maintain low levels of both forward and backward linkages. This result recalls the negative view that part of the literature has expressed about the increasing importance of personal services in the economy and the related implications for aggregated productivity and growth.

As per BS, although they are still located in the upper-left quadrant as a type II sector, they do not longer seem to be particularly strong. Indeed, there is a decrease in the magnitude of the total forward linkage with respect to the level of 1996. It can also be seen that a number of sectors including pipeline transportation, support to agriculture and postal services now show a higher value of forward linkage. In terms of backward linkage, BS have not seen major changes and thus remains weakly dependent on the input of other activities. We further characterise this trend by examining the strength of BS linkages in comparison to other relatively important sectors.

Figure 4: Hirschman Forward and Backward Linkages – 2016



Source: Own elaboration based on described methodology and Input-Output data of 2016.

(*ii*) *BS have expanded without increasing productive linkages*

Following Freytag and Fricke (2017), the productive linkages are further characterised by ranking sectors in terms of weighted linkages (WLS). That is, the sum of the backward and forward linkages is weighted by the shares in value added of each sector, providing a measure of the relative importance of the sectors in the economy.

Table 3 shows the WLS, backward (BL) and forward linkages (FL), in addition to the mentioned ranking and shares in value added by sector (%VA). In attention to their recent performance as shown previously, the following sectors are considered: financial services; wholesale and retail trade; and copper mining activities in addition to BS. The sum of value added of these 4 sectors accounted for 27% of total value added in 1996 and 34% in 2016. As reflected in their relatively high ranking, these sectors concentrate considerable leverage in the economy in terms of linkages.

Interestingly, with the sole exception of BS, the mentioned sectors are characterised by type I linkages, that is, generally independent from other sectors. That is, to a large extent the Chilean economy is dominated by the presence of generally independent sectors and thus lack interconectedness among productive sectors. Following the role of productive linkages in economic development previously discussed, this finding adds to the case for pushing selective industrial policy in the context of Chile.

It is also worth noting that both the pattern of linkages and the performance of the financial services is divergent from BS, confirming the analytic importance of treating these sectors separately. In the case of financial services, the decrease in backward linkages from 0.85 in 1996 to 0.75 in 2016, is compensated by an increase in the forward linkage from 0.74 to 0.87, rendering no visible changes in the WLS. However, this sector has experienced an increase in relative importance moving from the 8th place to the 6th.

In the case of the wholesale and retail trade sector, the backward linkage remained unchanged at 0.99, whereas the forward linkage decreased from 0.87 to 0.73. However, the WLS measure went from 0.19 to 0.31. Hence, the increased WLS in this case is mainly driven by the growing share of output experienced by this sector. Given its pattern of independence in terms of linkages (forward and backward linkages below the unity), the fact that wholesale and retail trade has been the most dynamic sector for the past two decades is a rather worrisome feature of the Chilean economy from the perspective of Hirschman's framework. The related implications for long-term growth and productivity should be further investigated.

As per the copper mining activities, a decreasing pattern in both backward and forward linkages is found. In terms of backward linkage, it decreased from 0.99 in 1996 to 0.84 in 2016; in terms of forward linkage it decreased from 0.68 to 0.48. However, WLS remained constant over the period, thus the decreased in linkages has been compensated by the expansion in share of output. Interestingly, the relative importance of this sector in the domestic economy has increased from the 5th position to the 3rd. Again, a trend that has been documented elsewhere by Castillo and Neto (2016).

Regarding BS, Table 3 shows that in 1996 the magnitude of the total forward linkage amounted 1.43 and then decreased to 1.02 in 2016; likewise the magnitude of the backward linkage decreased from 0.84 in 1996 to 0.79 in 2016. Conversely, the WLS increased from 0.15 to 0.20, reflecting the rising share of BS in total value added. Interestingly, in terms of relative importance in the economy, the sector gained prominence as it went from the 3rd

to the 2nd position.

In other words, although BS have decreased the strength of its productive linkages, the expansion of the sector has consolidated its relative importance in the domestic economy. Two possible interpretations of this counter-intuitive result are as follows. One, the dynamism of the sector cannot be explained *per se* by its productive linkages within the domestic economy; and second, the dynamism of the sector *per se* does not enhance domestic productive linkages. Yet, a causal assessment of these hypothesis escapes the scope of the present article thus this interpretations remain highly speculative. Still, as I arguehe in the upcoming section, this performance could be related to recent policy initiatives that led to the expansion of exports in BS.

Regardless of the causal mechanism at play, as long as the potential of BS in economic development is associated with their role in inter-industry demand, the decreased magnitude of productive linkages is likely to affect the prospects of knowledge and technological spillovers through BS. From the perspective of the policymaker concerned with economic development and growth, this results seems to point to the need for policy intervention to unfold more beneficial paths of structural change associated with BS. In this respect, further antecedents of BS pattern of linkages are provided by examining the sector in a disaggregated manner.

Table 3: Relative importance of productive linkages, selected sectors

	1996					2016				
Sectors	*BL*	*FL*	*WLS*	*%VA*	*Rank*	*BL*	*FL*	*WLS*	*%VA*	*Rank*
Business services	0.84	1.43	0.15	6.77	3	0.79	1.02	0.20	11.32	2
Copper mining	0.99	0.68	0.10	5.96	5	0.84	0.48	0.10	7.85	3
Financial services	0.85	0.74	0.06	3.78	8	0.75	0.87	0.06	3.94	6
Wholesale and retail trade	0.99	0.87	0.19	10.26	1	0.99	0.73	0.31	10.59	1

Note 1: WLS = sum of backward (*BL*) and forward linkages (*FL*) weighted by sectoral share in value added (*%VA*).

Note 2: Rank = relative position in descending order in terms of *WLS*.

(iii) BS are heterogeneous activities

As mentioned, the input-output table of 2016 allows a disaggregated analysis of BS. More specifically, the sector can be broken down into the five following subsectors: legal and accounting activities; architectural and engineering activities; other professional, scientific and technical activities; rental and leasing activities; and other support and administrative activities. Table 4 below details the value of backward linkages (BL), forward linkages (FL), the weighted linkages as specified above (WLS), the share in value added of the activity in the business services sector (%BS) and the share in the total value added of the economy (%VA).

The legal and accounting activities includes tasks such as bookkeeping, auditing and tax

consultancy in addition to legal representation and legal advice. Arguably, this subsector provides services that are essentially horizontal in the sense that any productive activity is likely to demand them. According to Table 4, the subsector its characterised by a pattern of linkages type II, showing a low value of BL (0.71) and the highest value of FL among BS subsectors (1.21). However, this subsector is the second-smallest component of BS, representing 12.3% of the BS and 1.4% of the overall value added. In consequence, as reflected by the WLS the relative importance of these activities are rather low.

The architectural and engineering activities comprises technical consultancy, urban projects, technical testing and analysis of building design and drafting, and civil engineering projects. Thus, this subsector in principle provides a more specialised type of service which is not necessarily equally required by all kinds of economic sectors. In terms of linkages, the subsector exhibits low levels of both BL (0.81) and FL (0.77) thus being characterised by type I as a generally independent sector. The size of this subsector is considerable, accounting for 23.3% of BS value added, and 2.6% of total value added. In opposition to the characteristics correspondent to legal and accounting activities, this subsector exhibit higher potential in terms of innovation and spillovers. Nonetheless, in light of the arguments deployed in the literature, the deficient interconnectedness of this subsector is likely to play against its potential.

Table 4: Breakdown of business services – 2016

Subsectors	*BL*	*FL*	*WLS*	*%BS*	*%VA*
Legal and accounting act.	0.71	1.21	0.027	12.3%	1.4%
Architectural and engineering act.	0.81	0.77	0.042	23.3%	2.6%
Other professional, scientific and technical act.	0.79	1.12	0.055	25.6%	2.9%
Rental and leasing activities	0.87	1.08	0.020	9.3%	1.1%
Other support and administrative act.	0.82	1.01	0.061	29.4%	3.3%

Note 1: WLS = sum of backward (*BL*) and forward linkages (*FL*) weighted by sectoral share in value added (*%VA*).

Note 2: %BS = share of subsector in BS value added.

Regarding other professional, scientific and technical activities, a variety of services are considered in this subsector. From specialised industrial design, to photographic activities, translation, business brokerage and other technical consulting in areas such as environmental impact, weather forecasting, security and agronomy. Despite the variegated collection of different activities, this subsector shows a type II pattern of linkages exhibiting high FL (1.12) and low BL (0.79). In terms of size, the sector accounts for 25.6% of the BS value added and almost 3% of overall value added. Interestingly, this sector enjoys both a considerable size and a high degree of interconnectedness. Although this is not tested with data, I speculate that this positive performance can be associated with recent policy efforts

concerned with the development of offshore services.

Differently, the rental and leasing activities which comprises the leasing of vehicles, machinery, equipment and other tangible goods in addition to intellectual property products. Arguably, this sector is more likely to have connections with capital-intensive activities. This sector shows a type II pattern of linkages, with FL equal to 1.08 and BL equal to 0.87. Nonetheless, this sector is the smallest component of BS, representing a 9.3% of the value added of BS and just over 1% of the overall value added.

Lastly, the other support and administrative activities include office support tasks such as photocopying, document preparation, customer service (e.g. call centres) and activities as such. Thus, these activities can be characterised as non-specialist, requiring low levels of training and likely to be demanded evenly across sectors. In terms of linkages, is characterised as a type II with low value of BL (0.82) and a relatively high value of FL (1.01). In terms of size, this subsector is the largest component of BS accounting for 29.4% and 3.3% of BS and overall value added respectively. Thus, this sector represents the bulk of the BS in the domestic economy, reflected in its high participation in output and showing an high interconnectedness. Nonetheless, considering the type of activities involved, this subsector is not likely to be particularly associated to dynamic sectors of the economy (e.g. manufacturing), nor seems to be a potential source for significant knowledge or technological spillovers.

From the perspective of enhancing economic development in the context of Chile, and taking into consideration the three outlined findings, it appears that current productive linkages are insufficiently developed. In particular, as reflected by the greater relative importance of BS, the weakened productive linkages and the composition of the sector, the prospects of economic gains associated with BS specialisation are significant but might not be realised if interconnectedness is not enhanced.

Given that this empirical assessment is essentially descriptive, this interpretation is necessarily preliminary and further investigation is to be conducted. Nonetheless, in light of the discussed rationales for intervention and the evidence on the positive relation between BS and innovation, trade and spillovers, it seems particularly relevant for Chile to design and implement targeted interventions towards BS in order to harness their potential. We now turn to discuss policy considerations in this respect.

5 Considerations for policy design in the Chilean case

Appropriate interpretation of the outlined empirical findings are uninformative if made without taking into account broader context of the case at hand. Here, to contribute with insights that are relevant to policy design in Chile, the evolution of industrial policy in historical perspective is briefly summarised. Then, salient aspects of policy such as rationales for intervention and design (e.g. objectives, domains of action), coupled with results of targeted interventions towards BS are discussed.

Subsequently, attempting to illustrate outcomes that a 'comparable' country has achieved by implementing targeted policy towards BS, the experience of Costa Rica offshore services is briefly reviewed. In spite of the necessarily imperfect nature of this comparison, I focus on discussing how the experience of Costa Rica is potentially informative for policy design in the context of Chile.

It is worth stressing that this section constitutes and exploratory exercise of policy analysis and thus any conclusion needs to be taken with caution.

An overview of relevant policy experience in Chile

The evolution of industrial policy in contemporary Chile can be divided into three main periods. First, the state-led development stage (1930s - 1973), symbolised by the creation of the national development agency *Corporación de Fomento para la Producción* (CORFO) in the aftermaths of the Great Depression which profoundly affected the Chilean economy (Bravo-Ortega and Eterovic, 2015). During this period, CORFO's role was paramount in steering public investment towards strategic areas, funding and managing state-owned enterprises, and crafting detailed sectoral programs in agriculture, manufacturing and mining activities (Ffrench-Davis et al., 2000b). This period was also characterised by implementing the import substitution strategy, with its associated protectionist approach to trade and industrialisation (Ffrench-Davis et al., 2000a).

Second, the dictatorship years (1973-1989), which following Ffrench-Davis (2010) can be subdivided into two waves. At the beginning, textbook neoliberal reforms including massive privatisations, labor and capital market deregulation took place, coupled with a general retrenchment of the state *vis-a-vis* market actors (Bravo-Ortega and Eterovic, 2015). Then, to cope with the deep socio-economic crisis over the 1980s, a more pragmatic orientation was followed. Indeed, economic adjustment required tighter regulation over banks and the financial system, capital accounts were intervened and more strategic trade policy instruments such as tariffs and selective export incentives were put in place (Ffrench-Davis, 2010).

Furthermore, discretionary selective interventions took place in the course of the military dictatorship. As documented by Lebdioui (2019), key vertical policies played a pivotal role in the emergence of new competitive sectors including forestry, salmon fishery and wine. To exemplify, by means of direct subsidies, tax exemptions and direct public investment through the state corporation CONAF, the forestry sector emerged as an exporting leader in the 1990s (Kurtz, 2001). Likewise, the fishing sector enjoyed special line of credits sponsored by CORFO and the experimentation and initiation phase of the salmon industry relied on joint ventures between foreign actors and local firms supported by CORFO over the 1980s (Bravo-Ortega and Eterovic, 2015).

Third, the transition years and further democratic period (1990s onwards). During these decades, economic policy mainly focused on macroeconomic stability and maintaining a favourable business environment while much efforts were allocated to strengthening social

policy (Solimano, 2012). As far as industrial policy is concerned, the market-oriented institutional framework inherited from the military regime remained substantially unchallenged until recently (Madariaga, 2016). In this vein, it has been documented that recent initiatives pushing forward a more strategic and articulated state involvement in economic development have been poorly financed and relegated to secondary roles (Bril-Mascarenhas and Madariaga, 2017).

Notwithstanding the dominance of horizontal instruments, selective interventions have not been completely absent over the past decade (Agosin et al., 2010). In the 2000s, CORFO launched the High Technology Investment Promotion Program, aimed towards attracting information and communications technology firms (Bravo-Ortega and Eterovic, 2015). More recently, aiming at promoting competitiveness of specific sectors based on their growth potential, a national cluster policy was implemented (Zahler et al., 2014a).

Interestingly, under the national cluster policy framework the emerging *Offshore global services* sector was targeted for intervention. Officially launched in 2007 and functional until 2010, the cluster comprised "the production and export of tradable, knowledge-intensive sectors, such as call centers, business process outsourcing (BPO), knowledge process outsourcing (KPO), business processing and analysis, engineering services, and others" (Zahler et al., 2014a). In terms of objectives, the program was set to increase the sector's exports from US$200 million in 2006, to US$1 billion in 2010 (ibid).

In line with scholarship on the determinants of BS specialisation which emphasise that region-specific characteristics matter (Meliciani and Savona, 2015), Lopez Giral and Muñoz Navia (2016) argue that the cluster emerged in light of Chile's strategic potential for off-shoring due to geographical advantages offered by spatial proximity and shared time zone to the United States market. Allegedly, these geographical features provide a comparative advantage *vis-a-vis* consolidated but distant providers of BS such as India.

In terms of rationales for intervention, the cluster policy was directly concerned with agglomeration economies and systemic failures related to the lack of knowledge flows between public and private actors (Zahler et al., 2014a). In addition, although it is not explicitly stated in available reports, I argue that up to a certain extent the associated instruments reflect a concern for upgrading domestic capabilities.

As per policy design, the policy comprised action lines in several domains including human capital and skills, international branding and marketing efforts, alignment of regulatory and legal frameworks with international standards, and investing in production capacity of local firms (Lopez Giral and Muñoz Navia, 2016). More concretely, actions in the domain of human capital aimed towards understanding and nurturing domestic capabilities through jobs profiles in addition to strengthening human capital supply through changes in higher institutions curricula and English language training for ICT specialists (Zahler et al., 2014a). Accordingly, instruments such as scholarships, tax exemptions and credit lines associated with training programs were opened.

As far as production capacity is concerned, the intervention involved investment in infrastructure for the creation of a technology hub in the outskirts of Santiago, an internationalisation strategy involving strategic consultancy and studies for developing a business model (Lopez Giral and Muñoz Navia, 2016). As per regulatory changes, the main initiative was the special migration regime, which in essence consisted of fast-track visas for high-skilled workers (López González et al., 2019; Zahler et al., 2014a).

Even though there is some evidence on the positive impact of the cluster, no systematic evaluation of the policy was conducted upon its termination. According to Lopez Giral and Muñoz Navia (2016), service exports increased substantially over the 2006-2010 period, 37 out 60 service centres were built through CORFO incentives, and 9000 jobs were created. Moreover, by means of interviews to participants, Zahler et al. (2014a) argue that international branding, sectoral coordination and human capital spillovers induced by the program would not have happened in the absence of it. Nonetheless, amidst the shift towards sectoral neutrality adopted by the new government administration in 2010, the cluster program ended abruptly (Zahler et al., 2014a; Bril-Mascarenhas and Madariaga, 2017).

This case is interesting in light of the output growth without strengthening productive linkages documented in the empirical assessment. On one hand, the relative success of this experience reassures the case for policy intervention towards BS. On the other hand, in view of the previously documented lack of productive linkages, there are reasonable doubts on the extent to which the support towards BS actually generated positive spillovers or enhanced productivity.

Other experiences of industrial policy concerned with service activities have taken place as public-private partnerships (PPP). Indeed, the export promotion agency ProChile launched the 'Sectoral Brands Program' which aimed to broadly promote domestic firms' exports through brand management, financial assistance and technical support for building the sector and country's image in global markets.[7] In this context, the *Architecture of Chile* brand was launched in 2009, aimed at positioning in international markets, generating scale economies for diffusion, and positioning the Chilean architectural professional services internationally (García Pérez et al., 2017).

The rationales for intervention in this case were market failures including asymmetries of information in international markets and investing in industrial commons for the sector (e.g. marketing and branding). In terms of domains of intervention, the program addressed regulatory barriers to entry into specific markets, and produced strategic consultancy reports, several audio-visual communication tools for marketing purposes, the creation of virtual platforms, and different promotion activities (García Pérez et al., 2017).

Drawing on a qualitative assessment, García Pérez et al. (2017) identified several design and implementation deficiencies, concluding that the objective of joining new markets appears to have failed. Additionally, García Pérez et al. (2017) suggest that difficulties with assess-

[7] For further details see ProChile's website here.

ing results and setting realistic measurable goals has affected the possibilities for further enhancing this intervention. Arguably, this resonates with well-known mismeasuring problems of services output (Gallouj and Savona, 2009), which targeted interventions towards BS should take into account in their design.

In connection to the outlined empirical findings, it is particularly interesting that the Architectural and engineering activities are the only subsector of BS that exhibited low backward and forward linkages. In view of the high knowledge content of these activities and associated potential positive spillovers, it seems particularly important to address the productive linkages associated with these activities. Moreover, given the importance of intermediate demand for BS to thrive and the evidence put forth by López González et al. (2019), it is not clear whether promoting this subsector in the international market without an explicit concern for their domestic productive linkages is actually beneficial. Thus, given the current focus and design of the *Architecture of Chile* program, reasonable doubts on the extent to which economic gains can be harnessed remain.

Another current policy concerned with services is the *World Class Mining Suppliers Program*. This targeted initiative started in 2008 as a private-led effort and gained support from publicly backed institutions such as *Fundación Chile* (FCh[8]) and the state-owned mining company CODELCO in 2012, which contributed to establishing a public-private partnership. The firms participating in this program range from capital goods suppliers to service activities including the so-called knowledge-intensive mining services (KIMS).[9]

In the context of mining-intensive countries such as Chile, the capabilities and learning processes involved in KIMS have been argued to not only enhance competitiveness for the mining activities, but also generate spillovers effects, innovation opportunities and development of technologies for related sectors (Urzúa, 2011). Indeed, KIMS involve consultancy, engineering, and other activities which are highly specialised in different tasks along the mining exploration and production process. For instance, some firms provide services for on-going operation (e.g. blasting engineering, equipment maintenance), while others provide services for investment projects (e.g. mine planning, exploration services) (Urzúa, 2012).

In terms of rationales, Bravo-Ortega and Muñoz (2015) argues that the program was set to address a range of market failures including asymmetric information between the mining companies and service suppliers, high transaction costs and inefficient risk pooling affecting SMEs innovation performance, indivisibilities of fixed assets required for operation, and economies of scale required for piloting mining technological solutions (Bravo-Ortega and Muñoz, 2017).

[8]FCh is a private non-profit company sponsored by the State of Chile that aims to generate international networks and promote innovation mainly related to the mining industry. Further details can be found here.

[9]Although KIMS are not strictly a subsector of BS, this policy experience illustrate relevant aspects regarding targeted interventions involving service suppliers.

In terms of objectives, the program has two main goals: to generate 250 high-level (world-class) suppliers by 2020; and to upgrade technical and managerial aspects of mining services which would lead to overall competitiveness enhancement for the mining industry (Bravo-Ortega and Muñoz, 2017). In other words, the program was set to enhance local production capacity as well as supporting suppliers in exporting activities.

The program is implemented through collaboration and preferential commercialisation agreements between the supplier and the mining company in accordance to productive and/or organisational challenges outlined by the mining company (Bravo-Ortega and Muñoz, 2015). Hence, problem-based projects allow the supplier to access R&D funding and incentives, and once the solution has been proved suitable, further support for scaling-up and commercialisation is provided (Bravo-Ortega and Muñoz, 2015). Interestingly, as the program is based on the collaborative work between suppliers and mining companies, productive linkages are explicitly induced.

As of today, a number of successful cases in diverse applications such as energy saving, enhanced maintenance routines, and process innovations have been reported. Nonetheless, a systematic evaluation has yet to be done and a number of difficulties have already been put forth. According to Correa Mautz (2016), deficiencies in the design of the policy and an unrealistic diagnostic of the productive capacity of the suppliers resulted in the initial goal of establishing 250 world-class suppliers by 2020 to be pushed forward to the year 2035.

More concretely, Bravo-Ortega and Muñoz (2015) points that difficulties associated with high levels of risk aversion of the mining companies, a weak industrial fabric and the absence of strong university-industry ties have hindered the effectiveness of the program. Arguably, these problems show that the presence of systemic failures both at the national and sectoral level were not considered, and that the policy design based on market failure rationales seems to not be sufficient. As discussed previously, the structural coordination problems and the national system of innovation literature provide a deeper understanding of how suppliers productive linkages enable economic development, thus stressing the need for a more comprehensive approach to the design of targeted interventions.

Furthermore, Correa Mautz (2016) argues that it is unclear whether local KIMS have actually benefitted from the program, arguing for a complementary policy on the forward side of the mining activities value chain. In other words, given that both the backward and forward linkages of the mining industry are low, supporting only the backward-linked industries (in this case through KIMS) will hardly create the conditions for beneficial spillovers to be widely realised. This resonates with the findings put forth by Bontadini and Savona (2019) on the potential for NRIs to generate backward-linked demand for BS. Here, as much as explicitly supporting suppliers, targeted policy towards BS sectors should be concerned with downstream activities where NRIs intermediate demand is generated, namely, towards manufacturing activities.

To sum up, the recent experience of industrial policy towards BS in Chile shows few accomplishments and several drawbacks. In particular, the *Offshore global service* cluster

seems to have contributed to the emergence of BS over the past years. Although the policy seems to have addressed systemic failures and strengthened capabilities for growing BS, it did not considered domestic productive linkages in its design. In view of the reviewed literature, one of the important mechanism by which BS spur potential productivity gains and spillovers through the rest of the economy was not addressed. This resonates with the precedent empirical assessment insofar as in spite of BS expansion, productive linkages were not enhanced over the analysed period.

In relation to the *Architecture of Chile* program aimed at inserting the architectural services in global markets, important caveats were revealed. In this case, it appears that policy design did not take into consideration specificities of BS, which led to problems with devising an appropriate monitoring and evaluation framework. Moreover, its rationale for intervention, mainly concerned with information asymmetries, seemed to be inadequate for a BS-subsector with relatively low levels of linkages. As outlined in the literature review section, productive linkages are also necessary for succeeding in international trade in services Meliciani and Savona (2015).

Lastly, regarding the *World Class Mining Suppliers Program*, the explicit association between KIMS and mining companies explicitly promoted the generation of productive linkages. However, mixed results have been reported and the program currently faces a number of obstacles. Arguably, it seems that market failures as the overarching rationale informing the policy design neglected issues associated with the ties between different relevant actors such as universities Bravo-Ortega and Muñoz (2015). More importantly, in light of the evidence provided by Correa Mautz (2016), it seems that the potential of the program is limited by the absence of strong linkages in the forward side of the mining companies.

Lessons from Costa Rica's offshore services

We now turn to briefly review the emergence of offshore services in Costa Rica. I argue that this case illustrates how targeted interventions towards BS are able to promote economic development and the type of challenges that emergent economies need to deal with. Noteworthy, Chile and Costa Rica share institutional and cultural legacies as former Spanish colonies, they both are relatively small export oriented economies in Latin America, exhibiting high levels of human development (UNDP, 2019). As stated previously, this exploratory analysis aims to provide insights to policy design in the context of Chile, albeit cautiously.

The process of structural change experienced by Costa Rica and its related economic and social achievements in terms of well-being indicators, growth of GDP and biodiversity conservation have been widely recognised (OECD, 2017, 2012). Interestingly, a development strategy based on human capital and technological capabilities allowed the country to upgrade its trade specialisation from mainly bananas and coffee, to high-value added goods such as electronics and offshore services (Rodríguez-Clare, 2001).

As most Latin American countries, Costa Rica followed the 'first wave' of industrial policy

based on state-led development, domestic industry protectionism and import substitution over the 1950s and 1970s (Cohen, 2000). However, amidst the 1980s debt crisis, it chose not to abandon the selective approach to industrial policy. Differently, the scope and objectives of selective policies were redefined towards non-traditional exports via income tax exemptions and Export Processing Zones (Monge-González et al., 2010). According to Murakami and Hernández (2016), the selective approach to attract FDI has been the main driver in the economic transformation of Costa Rica.

Arguably, one of the key anchors in this new export promotion model was the Costa Rican Investment Promotion Agency (CINDE), a private non-profit organization founded in 1983 with the support of the government in collaboration with USAID funding and local business people (Rodríguez-Clare, 2001). For most intents and purposes, this agency is the equivalent to CORFO in Chile. Nonetheless, unlike CORFO, CINDE retained an explicit focus on attracting strategic emerging sectors such as electronic components, high-tech medical devices and later on, software, IT and financial services as well (Monge-González et al., 2010; Paus and Gallagher, 2008).

In this context, a major leap forward resulted from the establishment of Intel Corporation during the late 1990s (Rodríguez-Clare, 2001). Interestingly, Agosin et al. (2010) documented that Chile tried but failed to attract Intel corporation as the authorities at the time were certain about maintaining economic neutrality in productive development and thus no special incentives were offered.

As proof of the importance of this investment in the context of Costa Rica, the electronics industry rised from virtually inexistence up to a third of total FDI inflows and its participation on gross exports grew from 1.4% to 24.6% over the 1997-2003 period (Paus and Gallagher, 2008). In addition, it has been documented that positive effects associated with Intel go beyond the direct impacts over jobs and income. According to Rodríguez-Clare (2001), additional investments were attracted as a result of international 'signalling' for high-tech business operations; support and reform of vocational training and higher education followed; and nurtured backward linkages brought by both foreign suppliers moving to Costa Rica and -to a lesser extent- by intermediate demand of local firms services. In other words, the domestic economy benefit not only because input demand but also by means of the broader spillover effects.

Shortly after, and in view of the economic gains brought about FDI, CINDE started to treat high value-added services as a strategic sector for FDI attraction. In doing so, the agency supports established firms towards re- investments, and collaborates with different actors of the national system of innovation to foster productive linkages and innovation (CINDE, 2015).

According to Murakami and Hernández (2016) the selective approach led by CINDE enabled an upgrading path for offshore services, from low- to high-knowledge intensive services. Indeed, Murakami and Hernández (2016) shows that international companies following Intel first developed call centres and administrative support tasks, but later, a progressive shift

towards digital design and engineering services took place. Noteworthy, this process seems particularly relevant and coherent with the evidence regarding beneficial GVC pathways presented by López González et al. (2019).

Consequently, the offshore services in Costa Rica have been steadily growing over the past decade. Indeed, by 2017 the ICT industry plus other knowledge-intensive services accounted for more than 20% of gross exports (Harvard Growth Lab, 2019).

Nonetheless, the extent to which this experience has actually nurtured indigenous capacity is subject to debate. According to Paus and Gallagher (2008), the FDI strategy has been insufficient for creating domestic capabilities. In this respect, they argue that backward linkages from the electronic sector towards domestic firms are limited to packaging and printing materials, and few local suppliers have actually succeeded in becoming competitive exporters of high-tech supplies.

Paus and Gallagher (2008) suggest that multinationals moving to Costa Rica helped in attracting foreign suppliers rather than providing the means for national firms to emerge. Furthermore, these authors stress that the persisting deficiency of domestic technological and managerial capabilities related to the lack of comprehensive strategies for supporting indigenous firms and knowledge-based local assets (Paus and Gallagher, 2008, p.76).

Summing up, this case illustrates how targeted incentives enabled specialisation in BS, providing an upgrading pathway from low to high skills services (Murakami and Hernández, 2016). Moreover, the selective FDI strategy seemed to have fostered productive linkages and produced knowledge spillovers, enhancing its trade performance and contributing to the economic transformation of the country (Rodríguez-Clare, 2001). Nonetheless, Paus and Gallagher (2008) considers that the CINDE strategy has been insufficient insofar as technological capabilities of local firms remained underdeveloped in comparison to that of the foreign suppliers.

In turn, this experience resonates with some of the crucial elements shown by the empirical findings and the analysis of policies in Chile. In particular, both in Chile and Costa Rica, policy experiences with favorable results seem to have two elements in common. First, they rely on rationales beyond market failures such as systemic failures and dynamic capabilities. Second, intermediate demand has been considered in policy design by coupling local suppliers with other producing activities. These preliminary conclusions opens an agenda for further policy research and should be tested with appropriate methods.

Table 5 summarises this comparison of targeted policies towards BS in Chile and Costa Rica, outlining policy cases by country in connection to the identified rationales for intervention, objectives, domains covered by their instruments and whether linkages where targeted.

Table 5: Industrial policy towards services in Chile and Costa Rica, a summary

		Design		
	Rationales	*Objectives*	*Domains*	*Targeted linkages*
Chile				
Offshore global services	Market failures: - agglomeration Systemic failures	Export promotion	Capital Skills Regulations	n/a
Architecture brand program	Market failures: - asymmetric information - industrial commons	Export promotion Brand positioning	Regulations Business strategy	n/a
World class mining suppliers	Market failures: - asymmetric information - investment indivisibilities - risk pooling failures	Development of suppliers Upgrade sectoral competitiveness Export promotion	Capital Technology	Mining company & local suppliers
Costa Rica				
Offshore services	Dynamic capabilities Systemic failures Market failures: - knowledge and technological spillovers	Structural change Export promotion Technological upgrading	Capital Skills Regulations Technology	IT multinationals & local suppliers

Source: Own elaboration.

6 Concluding remarks

In the context of industrial policy 'rejuvenation' (Stiglitz et al., 2013), the role of the state in actively promoting economic development through selective interventions is back on the agenda (Andreoni and Chang, 2019; O'Sullivan et al., 2013). In the case of emerging economies, industrial policy has also been re-examined in light of possible threats associated with 'premature deindustrialisation' (McMillan et al., 2017; Tregenna, 2015). Notwithstanding valid concerns about the increasing share of services in modern economies, recent contributions have shown that specialisation patterns in particular branches of services – notably BS – offer considerable prospects for economic development (Di Meglio et al., 2018; Felipe et al., 2009). Moreover, López González et al. (2019) have suggested that for effectively benefiting from BS specialisation, domestic conditions and productive linkages are paramount.

However, the literature has not sufficiently explored the role of targeted interventions towards BS in unfolding beneficial pathways of economic development and structural change. In order to shed light on this matter, this article put forth a review of the rationales for targeting BS. As discussed, not only market failures, but also structural coordination problems

and systemic failures provided relevant justifications for a selective approach towards BS. Furthermore, a review of the discussion between the rise of services and economic development revealed that BS exhibit distinctive features such as higher tradability, innovation and learning opportunities besides knowledge and technological spillovers. These features define the opportunities for economic gains associated with this sector.

To elucidate whether targeted interventions towards BS in the context of Chile may enhance economic development, an empirical assessment of productive linkages was put forth. Concretely, by means of input-output tables for the years 1996 and 2016, Hirschmanian productive linkages were quantified and classified according to the typology of Miller and Blair (2009). The used methodology has been widely employed to characterise 'key sectors' for economic development in new emergent economies (Freytag and Fricke, 2017; Marconi et al., 2016).

Three main findings stand out from this exercise. One, in line with expectations, BS exhibit a relatively high intensity of forward linkages. Second, the recent expansion of BS in terms of value added has not strengthened productive linkages. In other words, although BS is feeding inter-industry demand, BS growth in output was not accompanied by enhanced productive linkages. Third, as revealed by disaggregated analysis, considerable heterogeneity within BS subsectors is found. Here, it was shown that within BS there are particular branches that exhibit stronger productive linkages. This points to the insight that not all types of BS specialisation may be equally beneficial and thus targeted interventions should take into account this heterogeneity.

Given the nature of this analytic exercise, the discussion focused on describing and qualifying the productive linkages rather than providing theoretical explanations of their evolution. In other words, we provide no evidence of productive linkages explaining BS growth in output over the past decades, and further investigation on the causes of BS growth should be conducted.

Furthermore, although the literature has identified a number of limitations inherent to the input-output analysis, an in-depth methodological discussion also escapes the scope of this article. In any case, of particular relevance for this work are the following observations. The years available for the assessment may be critically biasing the results due to year-specific shocks, thus robustness checks in this regard are necessary. Moreover, although we analysed the evolution of linkages over a twenty years period, an assessment of the statistical significance of these changes could further inform the economic dynamics at play.

Nonetheless, in the interest of drawing relevant policy implications for Chile, recent interventions with a focus on BS were examined. It was suggested that although contemporary industrial policy has been largely concerned with horizontal policies, a handful of selective interventions towards services offer interesting insights on the role of productive linkages. Namely, by reviewing the rationales and design in terms of objectives, main instruments and whether productive linkages were explicitly targeted, limitations and inconsistencies in design were revealed.

Lastly, to illustrate the potential of BS targeted interventions for economic development, the emergence of offshore services in Costa Rica was reviewed. In particular, I showed that BS surged around electronics were a backbone of the process of structural change in Costa Rica. Moreover, up to a certain extent, the selective approach coupled with the concern for productive linkages seemed to have driven the outlined positive results, albeit with shortcomings.

Overall, this analysis suggest that in the case of Chile, selective interventions can play an important role in fostering economic development and harnessing potential benefits associated with BS. Although productive linkages are identified as crucial in the literature, and the policy assessment seems to confirm the positive role played in Costa Rica and Chile, the conducted empirical findings are not conclusive regarding its role in the emergence of BS in the Chilean case.

References

Acemoglu, D. and Restrepo, P. (2018). The Race between Man and Machine: Implications of Technology for Growth, Factor Shares, and Employment †. *American Economic Review*, 108(6):1488–1542.

Aghion, P., Boulanger, J., and Cohen, E. (2011). Rethingking Industrial Policy. *Bruegel Policy Brief*, (2011/04).

Aghion, P., Cai, J., Dewatripont, M., Du, L., Harrison, A., and Legros, P. (2015). Industrial Policy and Competition. *American Economic Journal: Macroeconomics*, 7(4):1–32.

Agosin, M. R., Larrain, C., and Grau, N. (2010). Industrial Policy in Chile. *IDB Working Paper Series*, IDB-WP-170.

Agostini, C. A. and Saavedra, E. (2009). La industrial del Petróleo en Chile. *Estudios Públicos*, 114(Otoño).

Álvarez, R., Bravo-Ortega, C., and Zahler, A. (2015). Innovation and Productivity in Services: Evidence from Chile. *Emerging Markets Finance and Trade*, 51(3).

Andreoni, A. (2016). The Varieties of Industrial Policy: Models, Packages, and Transformation Cycles. In Noman, A. and Stiglitz, J., editors, *Efficiency, Finance, and Varieties of Industrial Policy*, chapter 9. Columbia University Press.

Andreoni, A. and Chang, H.-J. (2019). The political economy of industrial policy: Structural interdependencies, policy alignment and conflict management. *Structural Change and Economic Dynamics*, 48:136–150.

Andreoni, A., Chang, H.-J., and Scazzieri, R. (2019). Industrial policy in context: Building blocks for an integrated and comparative political economy agenda. *Structural Change and Economic Dynamics*, 48:1–6.

Andreosso-O'Callaghan, B. and Yue, G. (2004). Intersectoral Linkages and Key Sectors in China , 1987 – 1997. *Asian Economic Journal*, 18(2).

Arntz, M., Gregory, T., and Zierahn, U. (2016).

The Risk of Automation for Jobs in OECD countries: A Comparative Analysis. *OECD Social, Employment and Migration Working Papers*, No. 189.

Atolia, M., Loungani, P., Marquis, M., and Papageorgiou, C. (2018). Rethinking Development Policy: Deindustrialization, Servicification and Structural Transformation. *IMF Working Papers*, WP/18/223.

Baldwin, R. (2011). Trade and industrialisation after globalisation's 2nd unbundling: How building and joining a supply chain are different and why it matters. *NBER Working Paper Series*, No. 17716.

Baldwin, R. and Lopez-Gonzalez, J. (2015). Supply-chain Trade: A Portrait of Global Patterns and Several Testable Hypotheses. *World Economy*, 38(11):1682–1721.

Bardhan, P. (1997). Corruption and Development: A Review of Issues. *Journal of Economic Literature*, 35(3):1320–1346.

Bartelme, D. and Gorodnichenko, Y. (2015). Linkages and Economic Development. *NBER Working Paper Series*, No. 21251.

Baumol, W. J. (1967). Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis. *The American Economic Review*, 57(3):415–426.

Baumol, W. J. (2012). *The cost disease: why computers get cheaper and health care doesn't.* Yale University Press.

Bontadini, F. and Savona, M. (2019). Revisiting the Natural Resource 'Curse' in the Context of Trade in Value Added: Enclave or High-development Backward Linkages? *SPRU Working Paper Series*, 15.

Bravo-Ortega, C. and Eterovic, N. (2015). A Historical Perspective of a Hundred Years of Industralization: From Vertical to Horizontal Policies in Chile. *Serie Documentos de Trabajo*, SDT 339.

Bravo-Ortega, C. and Muñoz, L. (2015). Knowledge Intensive Mining Services in Chile: Challenges and Opportunities for Future Development. *IDB Discussion Paper*, IDB-DP-418.

Bravo-Ortega, C. and Muñoz, L. (2017). Knowledge-Intensive Mining Services: a Regional Approach for their Development in Chile. *Serie Documentos de Trabajo*, SDT 448.

Bril-Mascarenhas, T. and Madariaga, A. (2017). Business power and the minimal state: the defeat of industrial policy in Chile. *Journal of Development Studies*, 55(6):1–20.

Cano-Kollmann, M., Hannigan, T., and Mudambi, R. (2018). Global Innovation Networks – Organizations and People. *Journal of International Management*, 24(2):87–92.

Cantner, U. and Vannuccini, S. (2018). Elements of a Schumpeterian catalytic research and innovation policy. *Industrial and Corporate Change*, 27(5):833–850.

Castellacci, F. (2008). Technological paradigms , regimes and trajectories: Manufacturing and service industries in a new taxonomy of sectoral patterns of innovation. *Research Policy*, 37:978–994.

Castillo, M. and Neto, A. M. (2016). Premature deindustrialization in Latin America. *CEPAL - Serie Desarrollo Productivo*, DP 205.

Central Bank of Chile (2019). Statistics Database.

Chenery, H. B. and Watanabe, T. (1958). International Comparisons of the Structure of Production. *Econometrica*, 26(4):487–521.

Cherif, R. and Hasanov, F. (2019). The Return of the Policy That Shall Not Be Named: Principles of Industrial Policy. *IMF Working Paper*, WP/19/74.

Ciarli, T. and Di Maio, M. (2014). Theoretical arguments for industrialisation-driven growth and economic development. In Matambalya, F., editor, *African Industrial Development and European Union Co-operation*, chapter 2. Routledge, London.

Cimoli, M., Dosi, G., and Stiglitz, J. E. (2009). The Political Economy of Capabilities Accumulation: The Past and Future of Policies for Industrial Development. In *Industrial Policies and Development: The political Economy of Capabilities Accumulation*. Oxford University Press.

Cimoli, M. and Porcile, G. (2014). Technology, structural change and BOP-constrained growth: A structuralist toolbox. *Cambridge Journal of Economics*, 38(1):215–237.

CINDE (2015). Strategic Plan 2015-2018. Technical report, Costa Rica Investment Promotion Agency, San Jose.

Cohen, I. (2000). Import Substitution, Economic Integration, and the Development of Central America, 1950-80. In Cárdenas, E., Ocampo, J. A., and Thorp, R., editors, *An Economic History of 20th Century Latin American*. Palgrave Macmillan, New York.

Correa Mautz, F. (2016). Encadenamientos productivos desde la minería de Chile. *CEPAL - Serie Desarrollo Productivo*, DP 203.

Dasgupta, S. and Singh, A. (2005). Will Services be the New Engine of Indian Economic Growth? *Development and Change*, 36(6):1035–1057.

Dasgupta, S. and Singh, A. (2006). Manufacturing, Services and Premature Deindustrialization in Developing Countries: A Kaldorian Analysis. *UNU-WIDER Research Paper*, No. 2006/49.

Desmarchelier, B., Djellal, F., and Gallouj, F. (2013). Knowledge intensive business services and long term growth. *Structural Change and Economic Dynamics*, 25:188–205.

Di Maio, M. (2014). Industrial policy. In Currie-Alder, B., Kanbur, R., Malone, D. M., and Medhora, R., editors, *International Development: Ideas, Experience, and Prospects*, chapter 32. Oxford Scholarship Online.

Di Meglio, G., Gallego, J., Maroto, A., and Savona, M. (2018). Services in Developing Economies: The Deindustrialization Debate in Perspective. *Development and Change*, 49(6):1495–1525.

Evangelista, R., Lucchese, M., and Meliciani, V. (2013). Business services, innovation and sec-

toral growth. *Structural Change and Economic Dynamics*, 25:119–132.

Evangelista, R., Lucchese, M., and Meliciani, V. (2015). Business services and the export performances of manufacturing industries. *Journal of Evolutionary Economics*, 25:959–981.

Felipe, J., León-Ledesma, M., Lanzafame, M., and Estrada, G. (2009). Sectoral engines of growth in developing asia: Stylised facts and implications. *Malaysian Journal of Economic Studies*, 46(2):107–133.

Ffrench-Davis, R. (2010). *Economic Reforms in Chile: From Dictatorship to Democracy*. Palgrave Macmillan, 2nd edition.

Ffrench-Davis, R., Muñoz, O., Benavente, J. M., and Crespi, G. (2000a). The Industrialization of Chile during Protectionism, 1940-82. In Cárdenas, E., Ocampo, J. A., and Thorp, R., editors, *An Economic History of 20th Century Latin American*. Palgrave Macmillan, New York.

Ffrench-Davis, R., Muñoz, O., Benavente, J. M., and Crespi, G. (2000b). The Industrialization of Chile during Protectionism, 1940–82. In *An Economic History of Twentieth-Century Latin America*, pages 114–153. Palgrave Macmillan UK, London.

Francois, J. and Hoekman, B. (2010). Services Trade and Policy. *Journal of Economic Literature*, 48(3):642–692.

Frankel, J. A. and Romer, D. (1999). Does Trade Cause Growth? *The American Economic Review*.

Freytag, A. and Fricke, S. (2017). Sectoral linkages of financial services as channels of economic development: An input – output analysis of the Nigerian and Kenyan economies. *Review of Development Finance*, 7:36–44.

Galeano Hernandez, S. and Gallego Perez, P. (2018). Overcoming The 'Middle-Income Trap': Chile Case Study. *Revista Mundo Asia Pacifico*, 8(13).

Gallouj, F. and Savona, M. (2009). Innovation in services: a review of the debate and a research agenda. *Journal of Evolutionary Economics*, 19:149–172.

García Pérez, C., López Giral, D., and Muñoz Navia, F. (2017). *Public Private Partnerships for Internationalization of Services: Chilean Architecture Industry*. Number 08. World Trade Institute.

Ghosh, A. (1958). Input-Output Approach in an Allocation System. *Economica*, 25(97):58–64.

Gruss, B. (2014). After the Boom-Commodity Prices and Economic Growth in Latin America and the Caribbean. *IMF Working Paper*.

Harvard Growth Lab (2019). The Atlas of Economic Complexity.

Haskel, J. and Westlake, S. (2017). *Capitalism without capital : the rise of the intangible economy*.

Hausmann, R., Hwang, J., and Rodrik, D. (2007). What you export matters. *Journal of Economic Growth*, 12:1–25.

Hausmann, R. and Rodrik, D. (2003). Economic

development as self-discovery. *Journal of Development Economics*, 72(2):603–633.

Hidalgo, C., Klinger, B., Barabasi, A.-L., and Hausmann, R. (2007). The Product Space Conditions the Development of Nations. *Science*, 317(July 2007):482–488.

Hirschman, A. O. (1958). *The strategy of economic development*. Yale University Press.

HM Government (2017). *Industrial Strategy: Building a Britain fit for the future*. Number November. Open Government Licence, London.

John, P. and Tarp, F. (2017). *The Practice of Industrial Policy: Government-Business Coordination in Africa and East Asia*. Oxford University Press, Oxford, unu-wider edition.

Jones, L. P. (1976). The Measurement of Hirschmanian Linkages. *The Quarterly Journal of Economics*, 90(2):323–333.

Kaldor, N. (1966). Causes of the Slow Rate of Economic Growth of the United Kingdom: An inaugural lecture.

Kox, H. and Rubalcaba, L. (2007). The Contribution of Business Services to European Economic Growth. In *Business Services in European Economic Growth*, chapter 4. Palgrave macmillan, NY.

Krueger, A. O. (1990). Government Failures in Development. *Journal of Economic Perspectives*, 4(3):9–23.

Krugman, P. (1995). *Development, Geography, and Economic Theory*. The MIT Press, Cambridge, MA.

Kurtz, M. (2001). State Developmentalism Without a Developmental State: The Public Foundations of the 'Free Market Miracle' in Chile. *Latin American Politics and Society*, 43(2):1–25.

Lall, S. (2004). Selective Industrial and Trade Policies in Developing Countries: Theoretical and Empirical Issues. In Soludo, C. O., Ogbu, M. O., and Chang, H.-J., editors, *The politics of trade and industrial policy in Africa : forced consensus?*, page 367. Africa World Press.

Lebdioui, A. (2019). Chile's Export Diversification since 1960: A Free Market Miracle or Mirage? *Development and Change*, 50(6):1624–1663.

Leontief, W. (1951). *The Structure of American Economy, 1919-1939: an empirical application of equilibrium analysis*. Oxford University Press, 2nd edition.

Leontief, W. (1953). *Studies in the structure of the American economy: Theoretical and empirical explorations in input-output analysis*. Oxford University Press.

Lopez Giral, D. and Muñoz Navia, F. (2016). Evaluation of public policies on production: the Chilean Global Service Cluster. In Hernández, R. A., Hualde, A., Mulder, N., and Sauvé, P., editors, *Innovation and internationalization of Latin American services*, chapter IV. UN–ECLAC.

López González, J., Meliciani, V., and Savona, M. (2019). When Linder meets Hirschman: inter-industry linkages and global value chains

in business services. *Industrial and Corporate Change*, pages 1–32.

Lorentz, A. and Savona, M. (2008). Evolutionary micro-dynamics and changes in the economic structure. *Journal of Evolutionary Economics*, 18:389–412.

Madariaga, A. (2016). Mechanisms of neoliberal resilience: comparing exchange rates and industrial policy in Chile and Estonia. *Socio-Economic Review*, 15(3):637–660.

Marconi, N., Rocha, I., and Magacho, G. (2016). Sectoral capabilities and productive structure: An input-output analysis of the key sectors of the Brazilian economy. *Brazilian Journal of Political Economy*, 143(3):470–492.

Mazzucato, M. (2016). From market fixing to market-creating: a new framework for innovation policy. *Industry and Innovation*, 23(2):140–156.

Mazzucato, M. (2019). Governing Missions in the European Union. Technical report, European Commission, Brussels.

McMillan, M., Rodrik, D., and Sepúlveda, C. (2017). *Structural change, fundamentals, and growth: A framework and case studies*. International Food Policy Research Institute and the World Bank, Washington DC.

Meliciani, V. and Savona, M. (2015). The determinants of regional specialisation in business services: agglomeration economies, vertical linkages and innovation. *Journal of Economic Geography*, 15:387–416.

Miller, R. E. and Blair, P. D. (2009). *Input-Output Analysis: Foundations and Extensions*. Cambridge University Press, New York, 2nd edition.

Miozzo, M. and Soete, L. (2001). Internationalization of Services: A technological perspective. *Technological Forecasting and Social Change*, 67(2-3):159–185.

Miroudot, S. and Cadestin, C. (2017). Services in Global Value Chains: From inputs to value-creating activities. *OECD Trade Policy Papers*, No. 197.

Monge-González, R., Rivera, L., and Rosales-Tijerino, J. (2010). Productive Development Policies in Costa Rica: Market Failures, Government Failures and Policy Outcomes. *IDB Working Paper Series*, (No. IDBP-WP-157).

Monge-González, R. and Tacsir, E. (2014). Policy Coordination: From FDI to a Broader Framework to Promote Innovation - The Case of Costa Rica. In Crespi, G. and Dutrénit, G., editors, *Science, technology and innovation policies for development: The Latin American experience*. Springer International Publishing.

Murakami, Y. and Hernández, R. A. (2016). Revealing the spillover effects of foreign direct investment on offshore services in Costa Rica. In Hernández, R. A., Hualde, A., Mulder, N., and Sauvé, P., editors, *Innovation and internationalization of Latin American services*, chapter Chapter IV. UN–ECLAC.

Murphy, K. M., Shleifer, A., and Vishny, R. W. (1989). Industrialization and the Big Push. *Journal of Political Economy*, 97(5):1003–1026.

Nasirov, S. and Silva, C. (2014). Diversification of Chilean Energy Matrix : Recent Developments and Challenges. *International Association for Energy Economics*, 4th Quarter:27–31.

Nazara, S., Guo, D., Hewings, G. J. D., and Dridi, C. (2003). *PyIO: Input-Output Analysis with Python*. REAL Working Papers. University of Illinois at Urbana-Champaign.

Nelson, R. R. (1993). *National Innovation Systems: A Comparative Analysis*. Oxford University Press, New York.

Nordhaus, W. D. (2008). Baumol's Diseases: A Macroeconomic Perspective. *The B.E. Journal of Macroeconomics*, 8(1).

Ocampo, J. A., Rada, C., and Taylor, L. (2009). *Growth and Policy in Developing Countries: A Structuralist Approach*. Columbia University Press, New York.

OECD (2012). Attracting Knowledge-Intensive FDI to Costa Rica: Challenges and Policy Options. *Making Development Happen Series*, 1.

OECD (2017). OECD Reviews of Innovation Policy: Costa Rica 2017. Technical report, Paris.

OECD (2018a). *OECD Economic Surveys: Chile 2018*. OECD Publishing, Paris.

OECD (2018b). Trade in Value Added Database.

O'Sullivan, E., Andreoni, A., López-Gómez, C., and Gregory, M. (2013). What is new in the new industrial policy? A manufacturing systems perspective. *Oxford Review of Economic Policy*, 29(2):432–462.

Oulton, N. (2001). Must the growth rate decline? Baumol's unbalanced growth revisited. *Oxford Economic Papers*, 53:605–627.

Owen, G. (2012). Industrial policy in Europe since the Second World War: what has been learnt? *ECIPE Occasional Paper*, 1:5,20–23.

Pack, H. and Saggi, K. (2006). Is there a case for industrial policy? A critical survey. *World Bank Research Observer*, 21(2):267–297.

Palma, G. (2009). Flying Geese and Waddling Ducks: The Different Capabilities of East Asia and Latin America to 'Demand-Adapt' and 'Supply-Upgrade' their Export Productive Capacity. In Cimoli, M., Dosi, G., and Stiglitz, J. E., editors, *Industrial Policy and Development: The Political Economy of Capabilities Accumulation*. Oxford University Press.

Paus, E. A. and Gallagher, K. P. (2008). Missing links: Foreign investment and industrial development in Costa Rica and Mexico. *Studies in Comparative International Development*, 43(1):53–80.

Pavitt, K. (1984). Sectoral patterns of technical change: Towards a taxonomy and a theory. *Research Policy*, 13(1984):343–373.

Peneder, M., Kaniovski, S., and Dachs, B. (2003). What follows tertiarisation? structural change and the role of knowledge-based services. *The Service Industries Journal*, 23(2):47–66.

Rasmussen, N. P. (1956). *Studies in Inter-Sectoral Relations*. North-Holland Publisihing Co.

Rodriguez-Clare, A. (1996). The division of labor

and economic development. *Journal of Development Economics*, 49:3–32.

Rodríguez-Clare, A. (2001). Costa Rica's Development Strategy based on Human Capital and Technology: How it got there, the impact of Intel, and lessons for other countries. *Journal of Human Development*, 2(2).

Rodrik, D. (1996). Coordination failures and government policy: A model with applications to East Asia and Eastern Europe. *Journal of International Economics*, 40:1–22.

Rodrik, D. (2008). *Normalizing Industrial Policy*. Commission on Growth and Development Working Paper. Washington DC.

Rodrik, D. (2016). Premature deindustrialization. *Journal of Economic Growth*, 21:1–33.

Rodrik, D. (2018). *New Technologies, Global Value Chains and the Developing Economies*. Pathways for Prosperity Commission Background Paper Series. Oxford, UK.

Rodrik, D. (2019). *Where are we in the economics of industrial policies?* VoxDev.

Rosenstein-Rodan, P. N. (1943). Problems of Industrialisation of Eastern and South-Eastern Europe. *The Economic Journal*, 53(210/211):202.

Sarmiento-Barbieri, I. and Wade, J. (2019). Package ' ioanalysis ' v.0.2.1. Technical report.

Savona, M. (2015). Global Structural Change and Value Chains in Services. A Reappraisal. *SPRU Working Paper Series*, 2015-19.

Savona, M. (2018). Industrial policy for a European industrial renaissance: A few reflections. *SPRU Working Paper Series*, 2018-07.

Singh, A. (1977). UK industry and the world economy: a case of de-industrialisation? *Cambridge Journal of Economics*, 1:113–136.

Soete, L. (2007). From industrial to innovation policy. *Journal of Industry, Competition and Trade*, 7(3-4):273–284.

Solimano, A. (2012). Economic Growth and Macroeconomic Performance in the 1990s and 2000s under Four Concertación Governments. In *Chile and the Neoliberal Trap*, chapter 4, pages 50–73. Cambridge University Press.

Stiglitz, J. E., Lin, J. Y., and Monga, C. (2013). The Rejuvenation of Industrial Policy. In *The Industrial Policy Revolution I*, pages 1–15. Palgrave Macmillan UK, London.

Timmer, M. P., Azeez Erumban, A., Los, B., Stehrer, R., and de Vries, G. J. (2014). Slicing Up Global Value Chains. *Journal of Economic Perspectives*, 28(2):99–118.

Todaro, M. P. and Smith, S. C. (2012). *Economic Development*. Addison-Wesley.

Tregenna, F. (2009). Characterising deindustrialisation: An analysis of changes in manufacturing employment and output internationally. *Cambridge Journal of Economics*, 33:433–466.

Tregenna, F. (2014). A new theoretical analysis of deindustrialisation. *Cambridge Journal of Economics*, 38:1373–1390.

Tregenna, F. (2015). *Deindustrialisation, structural change and sustainable economic growth*.

Background paper for UNIDO 2015 Industrial Development Report.

Tripplet, J. and Bosworth, B. (2006). 'Baumol's Disease' has been Cured: IT and Multifactor Productivity in US Service Industries. In Jansen, D., editor, *The New Economy and Beyond*, chapter 3. Edward Elgar Publishing.

UNDP (2019). Human Development Reports.

United Nations (2008). International Standard Industrial Classification of All Economic Activities (ISIC), Rev.4. Technical report, UN Department of Economic and Social Affairs, Statistics Division, New York.

Urzúa, O. (2011). *The emergence and development of knowledge intensive mining service suppliers in the late 20 th century*. PhD thesis, Unversity of Sussex.

Urzúa, O. (2012). Emergence and Development of Knowledge-Intensive Mining Services (KIMS). *Working Papers in Technology Governance and Economic Dynamics*, No. 41.

Wade, R. H. (2018). The Developmental State: Dead or Alive? *Development and Change*, 49(2):518–546.

Warwick, K. (2013). Beyond Industrial Policy: Emerging Issues and New Trends. *OECD Science, Technology and Industry Policy Papers*, (2):57.

Williamson, J. (2004). The Strange History of the Washington Consensus. *Journal of Post Keynesian Economics*, 27(2):195–206.

Wu, L. G. and Baumol, W. J. (2012). Productivity Growth, Employment Allocation, and the Special Case of Business Services. In *The Cost Disease: why computers get cheaper and health care doesn't*, chapter 9. Yale University Press.

Young, A. (2014). Structural Transformation, the Mismeasurement of Productivity Growth, and the Cost Disease of Services. *American Economic Review*, 104(11):3635–3667.

Zahler, A., Bravo-Ortega, C., Goya, D., and Benavente, J. M. (2014a). *Public-Private Collaboration on Productive Development Policies in Chile*. IDB Working Paper Series. IADB.

Zahler, A., Iacovone, L., and Mattoo, A. (2014b). Trade and innovation in services: Evidence from a developing economy. *World Economy*, 37(7):953–979.

Appendix

INSERT HERE

[A1: Complete set of productive linkages 1996]

[A2: Complete set of productive linkages 2016]

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