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Abstract

The paper provides insights into captive financial institutions and money lenders (sector S127) in Luxembourg. To this end, the paper relies on two metrics: the total assets and the total number of S127 entities. The analysis breaks down the evolution of both metrics across various dimensions: by main economic activity performed by the groups owning S127 entities, by nationality of the groups, by geographical counterpart of the balance sheet of S127 entities, by balance sheet item and by type of S127 firm. The period covers Dec. 2014 - Dec. 2019. Given data availability, the analysis relies on a sub-sample of the whole population of S127 firms. This sub-sample features S127 firms whose total assets are at least equal to EUR 500 million. As of Dec. 2018, this sub-sample represents about 5% of the total number of S127 firms in Luxembourg, and about 85% of the total assets held by S127 firms in Luxembourg. Results show that groups resorting to S127 entities perform various economic activities. Groups undertaking non-financial activities account for 80% of the total assets held by S127 entities and 70% of the total number of S127 entities. The remaining share relates to groups involved in financial activities. Across economic activities, the finance and insurance industry - and notably investment funds - holds the most important share of assets and number of entities in the sample of S127 firms. Groups headquartered in the United States own the major share of S127 entities, whether in terms of total assets or number of S127 entities. Luxembourg represents the most important balance sheet counterpart of S127 entities, suggesting that groups own several captive financial institutions in Luxembourg. The predominant financing means in the aggregated balance sheet of S127 entities mainly relate to equity and debt both as direct investment. The most important type of S127 entities are holding entities, followed by intragroup lending corporations and mixed structures. The dynamic analysis shows that total assets held by S127 entities increased over the period Dec. 2014 - June 2017 and decreased from July 2017 to Dec. 2019. The total number of S127 entities rose over the period Dec. 2014 - Nov. 2018 and declined between Dec. 2018 and Dec. 2019. The main contributors underlying these dynamics differ in terms of magnitude and sign over time, depending on the main economic activity performed by the groups owning S127 entities, the nationality of the groups, the balance sheet counterpart of S127 entities, the balance sheet item and the type of S127 firm. The main motive driving the expansion phase of the number of S127 entities before Dec. 2018 relates to entities created in the past and whose total assets increased above the EUR 500 million reporting threshold. The main motives driving the decrease in the number of S127 entities after Dec. 2018 pertain to S127 entities whose total assets fell below the EUR 500 million reporting threshold but that are still operating, and to liquidations of S127 entities.

Keywords: Captive financial institutions and money lenders, Sector S127, Multinational Enterprises (MNEs), Ownership chains, Organizational structure

JEL codes: C80, C81, L22

Contact: gabriele.difilippo@bcl.lu, frederic.pierret@bcl.lu **Disclaimer:** This paper should not be reported as representing the views of the Banque centrale du Luxembourg or the Eurosystem. The views expressed are those of the authors and may not be shared by other research staff or policymakers in the Banque centrale du Luxembourg or the Eurosystem. **Acknowledgements:** For their suggestions and comments, the authors would like to thank Germain Stammet, Allal Boussata, Christophe Duclos, Paul Feuvrier, Kola Lendele and Ingber Roymans. We are also grateful to the people that contributed to the collection and compilation of the BCL database on S127 corporations. Any remaining errors are the sole responsibility of the authors.

Table of Contents

Non-Technical Summary

The paper provides insights into captive financial institutions and money lenders (sector S127) in Luxembourg. To this end, the paper relies on two metrics: the total assets and the total number of S127 entities. The analysis breaks down the evolution of both metrics across various dimensions: by main economic activity performed by the groups owning S127 entities, by nationality of the groups, by geographical counterpart of the balance sheet of S127 entities, by balance sheet item, and by type of entity. The period covers Dec. 2014 - Dec. 2019. Owing to data availability, the analysis relies on a sub-sample of the whole population of S127 firms. This sub-sample features S127 firms whose total assets are at least equal to EUR 500 million. As of Dec. 2018, this sub-sample represents about 5% of the total number of S127 firms in Luxembourg, and about 85% of the total assets held by S127 firms in Luxembourg.

The static analysis shows that groups resorting to S127 entities perform various economic activities. Groups undertaking non-financial activities account for 80% of the total assets held by S127 entities and 70% of the total number of S127 entities. The remaining share relates to groups involved in financial activities. Across economic activities, the finance and insurance industry - and notably investment funds - holds the most important share of assets and number of entities in the sample of S127 firms. Groups headquartered in the United States own the major share of S127 entities, whether in terms of total assets or number of entities. The remainder is mainly divided between European countries (notably the euro area), followed by East Asia and the rest of the world. The geographical breakdown of the balance sheet of S127 entities shows that their main counterparts are, on the whole, located in the euro area. The rest is mainly shared by other European countries (notably the United Kingdom and Switzerland), followed by North America, East Asia and the rest of the world. Amongst individual countries, Luxembourg represents the most important balance sheet counterpart of S127 entities. This suggests that most multinational enterprises own more than one S127 entity in Luxembourg. The aggregated balance sheet of S127 entities mainly features equity and debt, both as direct investment. This suggests that S127 entities mainly favour capital shares (equity as direct investment) and intra-group loans (debt as direct investment) as financing means. The typology of S127 entities shows that the sample of S127 entities primarily features holding corporations, followed by intragroup lending companies, mixed structures, conduits and loan origination companies. The remaining types include captive factoring and invoicing corporations, companies with predominant non-financial assets, extra-group loan origination firms, wealth-holding entities and captive financial leasing corporations.

The dynamic analysis highlights that the total assets held by S127 entities increased over the period Dec. 2014 - June 2017 and decreased from July 2017 to Dec. 2019. The total number of S127 entities rose over the period Dec. 2014 - Nov. 2018 and declined between Dec. 2018 and Dec. 2019. The paper investigates the main contributors to these dynamics across various dimensions. Results show that the contribution of S127 entities differs in terms of magnitude and sign over time, depending on the main economic activity performed by the groups owning S127 entities, the nationality of the groups, the balance sheet counterpart of S127 entities, the balance sheet item and the type of S127 firm. The main motive driving the expansion phase of the number of S127 entities before Dec. 2018 relates to entities created in the past and whose total assets increased above the EUR 500 million reporting threshold. The main motives driving the decrease in the number of S127 entities after Dec. 2018 pertain to S127 entities whose total assets fell below the EUR 500 million reporting threshold but that are still operating, and to liquidations of S127 entities.

Résumé Non Technique

Le document fournit des informations sur les institutions financières captives et prêteurs non institutionnels (secteur S127) au Luxembourg. Le document s'appuie sur deux mesures: l'actif total et le nombre total d'entités S127, dont l'évolution est décomposée à travers différentes dimensions: par activité économique des groupes possédant des entités S127, par nationalité des groupes, par contrepartie géographique du bilan des entités S127, par rubrique bilantaire et par type d'entités S127. La période d'analyse s'étend de décembre 2014 à décembre 2019. Compte tenu de la disponibilité des données, l'analyse repose sur un sous-échantillon de l'ensemble de la population des entités S127. Ce sous-échantillon comprend les entités dont l'actif total est au moins égal à 500 millions d'euros. En décembre 2018, ce sous-échantillon représentait environ 5% du nombre total d'entités S127 au Luxembourg et environ 85% de l'actif total détenu par les entités S127 au Luxembourg.

L'analyse statique montre que les groupes recourant aux entités S127 exercent différentes activités économiques. Les groupes exerçant des activités non-financières représentent 80% du total des actifs détenus par les entités S127 et 70% du nombre total d'entités S127. La part restante concerne les groupes exerçant des activités financières. A travers les activités économiques, le secteur de la finance et des assurances - et notamment les fonds d'investissement - détient la part la plus importante d'actifs et de nombre d'entités dans l'échantillon considéré. Les groupes ayant leur siège social aux États-Unis détiennent la majeure partie des entités S127, que ce soit en termes d'actif total ou de nombre d'entités. Le reste est principalement partagé entre pays européens (notamment la zone euro), suivi par l'Asie de l'Est et le reste du monde. La répartition géographique du bilan des entités S127 montre que leurs principales contreparties sont majoritairement situées en zone euro. Le reste est principalement partagé entre les autres pays européens (notamment le Royaume-Uni et la Suisse), l'Amérique du Nord, l'Asie de l'Est et le reste du monde. Par ailleurs, le Luxembourg représente la contrepartie la plus importante du bilan des entités S127. Cela suggère que la plupart des entreprises multinationales possèdent plus d'une entité S127 au Luxembourg. Le bilan agrégé des entités S127 comprend principalement des titres de participation et des instruments de dette, tous deux sous forme d'investissement direct. Cela suggère que les entités S127 privilégient principalement les participations au capital (titres de participation en tant qu'investissement direct) et les prêts intra-groupe (dette en tant qu'investissement direct) comme moyens de financement. La typologie des entités S127 montre

que l'échantillon d'entités S127 comprend principalement des sociétés holdings, des sociétés de prêt intragroupe, des structures mixtes, des conduits et des sociétés de montage de prêts. Les autres types regroupent les entreprises captives d'affacturage et de facturation, les sociétés ayant des actifs non financiers prédominants, les entreprises de montage de prêts en dehors du groupe, les sociétés de gestion de patrimoine familial et les entreprises captives de crédit-bail financier.

L'analyse dynamique montre que le total des actifs détenus par les entités S127 a augmenté au cours de la période décembre 2014 - juin 2017 puis diminué de juillet 2017 à décembre 2019. Le nombre total d'entités S127 s'est accru au cours de la période décembre 2014 - novembre 2018 puis a baissé entre décembre 2018 et décembre 2019. Le document examine les principaux contributeurs à ces dynamiques à travers différentes dimensions. Les résultats montrent que la contribution des entités S127 varie en termes d'intensité et de signe au cours du temps, selon l'activité économique exercée par les groupes possédant des entités S127, la nationalité des groupes, la contrepartie du bilan des entités S127, la rubrique bilantaire et le type d'entité. Le motif principal concourant à la phase d'expansion du nombre d'entités S127 avant décembre 2018 concerne les entités créées antérieurement et dont la taille du bilan dépasse le seuil de reporting fixé à 500 millions d'euros. Les principaux motifs liés à la baisse du nombre d'entités S127 après décembre 2018 concernent les entités S127 dont la taille du bilan diminue sous le seuil de reporting de 500 millions d'euros mais qui sont toujours en activité, auxquelles s'ajoutent les liquidations d'entités S127.

1. Introduction

Globalisation aided the rise of multinational enterprises. According to Dunning and Lundan (2008), a multinational enterprise (MNE) is an enterprise that engages in foreign direct investment (FDI) and oversees value-added activities located in different countries worldwide (geographical fragmentation) and features different positions along the value chain (vertical fragmentation).

Competing with their peers, MNEs build their growth strategy with respect to a kaleidoscope of variables (Kenney and Florida (2004), UNCTAD (2016)): minimisation of labour cost, acquisition of skills and knowledge, search for natural resources, access to different forms of capital, quest for new markets and customers, *etc*. MNEs often mold their structure with respect to the aforementioned constraints and opportunities, in the most strategic and efficient manner, with regard to risks, costs and taxes. This can lead to complex MNE structures.

MNEs often resort to holding and finance entities to control their affiliates, finance their business activities and structure their strategic corporate investments. International statistical standards classify these holding and finance entities as captive financial institutions and money lenders (sector S127), a sub-sector of financial companies (UN (2009), IMF (2009), EC (2013)). Within the structure of MNEs, S127 entities act as financial intermediaries and are often positioned between the headquarters (the decision-making body) and the operational affiliates (the production bodies). Their activities cover a large number of tasks: *e.g.* the holding of participations, intragroup lending, debt issuance, loan origination, financial leasing, treasury management, accounting and reporting, risk management, intellectual property management, carbon trading, *etc*. In this respect, S127 entities are often located in financial centres that feature stable and cross-border access to different forms of finance. The activity of S127 entities often contributes to increased FDI flows within financial centres, leading to large FDI stocks. Luxembourg - a global financial centre - is no exception.

In Luxembourg, FDI flows stemming from captive financial institutions and money lenders account for a substantial part of FDI stocks. The business of S127 entities also contributes to support economic activity. As a result, there is a need to understand the main contributors to the activity of S127 entities. To this end, the paper tackles the following questions:

- What is the main economic activity performed by the groups resorting to S127 entities?
- Where are headquarters of the groups owning S127 entities located? In other words, what is the nationality of groups utilising S127 entities?

- What is the geographical counterpart of the balance sheet of S127 entities?
- Which financing means do S127 entities favour?
- What types of S127 entities characterise the sector of captive financial institutions?
- What are the motives driving the evolution of the number of S127 entities in the sample compiled by the Banque centrale du Luxembourg (BCL)?

To our best knowledge, the literature has not addressed yet the aforementioned questions for Luxembourg. Against this background, the paper analyses the total assets and the total number of S127 entities across various dimensions: by main economic activity performed by the groups owning S127 entities, by nationality of the groups, by geographical counterpart of the balance sheet of S127 entities, by balance sheet item and by type of S127 firm. The paper undertakes both a static and a dynamic analysis. In the latter, it breaks down the evolution of total assets and total number of S127 entities across the aforementioned dimensions. The period covers Dec. 2014 - Dec. 2019. Owing to data availability, the analysis relies on a sub-sample of the whole population of S127 firms. This sub-sample features S127 firms whose total assets are at least equal to EUR 500 million. As of Dec. 2018, this sub-sample represents about 5% of the total number of S127 firms in Luxembourg, and about 85% of the total assets held by S127 firms in Luxembourg.

This paper can be considered as a sequel of the paper on the typology of sector S127 by Di Filippo and Pierret (2020). It can also be deemed as a preliminary and necessary exercise before modelling the potential determinants driving the dynamics of captive financial institutions and money lenders in Luxembourg. A potential innovation brought by the paper relates to the breakdown of total assets and number of S127 entities by main economic activity carried out by the groups owning S127 entities and by nationality of the groups utilising S127 entities. Indeed, this breakdown can offer an alternative map of capital flows (notably FDI flows) compared to the usual bilateral country counterparties as registered in the Balance of Payments (BoP).

The remainder of the paper comprises the following sections. Section 2 re-examines the key concepts surrounding MNE ownership structures. It also reviews the literature that assessed the relative proportions of flat *versus* complex MNE structures along with the factors driving MNE ownership chains. Section 3 introduces the data under consideration. Section 4 takes a static approach and presents the key features of sector S127 in Luxembourg. Section 5 analyses the main contributors to the evolution of total assets and total number of S127 entities over time. Section 6 presents the conclusions.

2. MNE ownership structures: concepts and empirical evidence

2.1 MNE ownership structures: key concepts

MNE ownership structures usually take the form of a parent institution (or headquarters) controlling directly or indirectly diverse foreign operational entities located in different jurisdictions and performing various operational activities. The parent is tied to its affiliates *via* ownership links[1]. The latter may feature different degrees of equity ownership that ultimately determine the level of control by the parent over each affiliate.

Ownership chains involve different frameworks spanning from simple to complex structures[2]. A simple (or flat) structure involves short ownership chains and no cross-border ownership connections among the foreign affiliates. Conversely, a complex structure features long ownership chains with multiple cross-border links, ownership hubs centralising ownership links and shared ownership structures (such as joint ventures or partnerships).

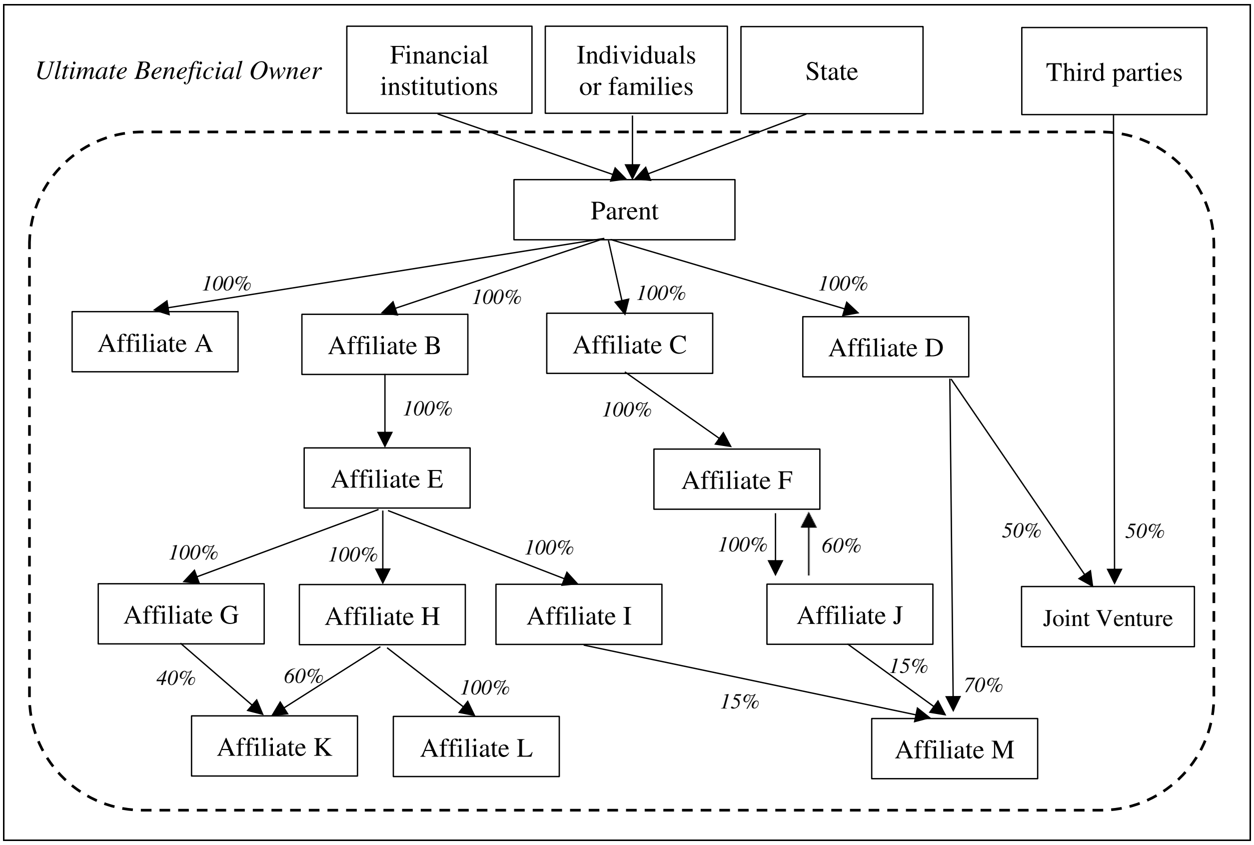
Diagram 1 presents a hypothetical complex structure of a MNE. The parent is connected to its affiliates through one or several layers of equity ownership links, which determine its direct or indirect level of control. To be considered as direct investment, the equity ownership must be larger than or equal to 10%, otherwise the equity ownership falls under the portfolio investment category. In this example, the parent is the ultimate owner of affiliates A to M. The parent also owns a shared partnership (or joint venture) with a third party[3]. The parent itself can feature various beneficial owners. The latter can relate to private entrepreneur families (*e.g.* a group of entrepreneurs that originally set up the corporation or relatives of the entrepreneur), private financial institutions (*e.g.* investment funds taking holdings in the parent) or a public owner (*e.g.* a State holding shares in the parent).

[1] Following UNCTAD (2016), the paper favours the terminology "affiliate" to "subsidiary". Indeed, the term "affiliate" is a synonym of "subsidiary", if the subsidiary is a majority-owned affiliate.

[2] For more information, see Lewellen and Robinson (2014) and UNCTAD (2016), notably "Chapter IV: Investor Nationality: Policy Challenges", p. 123-193 *in* "World Investment Report 2016: Investor Nationality: Policy Challenges", United Nations Publications, New York

[3] UNCTAD (2016) notes that joint ventures do not necessitate an equal division of shares (one partner can be the controlling partner) and can involve more than two partners.

Diagram 1: Hypothetical complex structure of a MNE



Source: Adapted from UNCTAD (2016)

Affiliates located at the end of the ownership chain usually are production or operating units (*e.g.* affiliates K, L and M). The parent often resorts to centralised financial entities labelled as "captive financial institutions and money lenders" (sector S127) to organise the ownership of these units and manage their finances.

While the jurisdiction of the incorporation of the parent determines the nationality of the corporate group, affiliates can be located in different countries worldwide. This implies that cross-border financial flows between the parent and its affiliates will be registered in the Balance of Payments of the countries where these respective entities are located. In addition, a MNE's affiliates and especially production units can undertake activities in specific stages of the value chain (whether upstream, midstream or downstream). On the other hand, a MNE can manage all stages of the value chain by owning production units from upstream to downstream activities. This likely generates intra-firm trade of intermediate inputs between the production units of the group in order to produce the final product. A MNE can specialise in a given economic activity (*e.g.*

pharmaceuticals, petrochemicals, food and beverages, automotive components, computer services, *etc.*). It can also diversify its activities and take the form of a conglomerate, performing multiple industrial and service activities by means of its affiliates[4].

The complexity of a MNE structure can be assessed vertically or horizontally. Vertical complexity refers to the hierarchical depth of a group or the maximum hierarchical distance between the parent and its affiliates. In the aforementioned hypothetical example, the maximum hierarchical level amounts to four[5]. Vertical complexity is often associated with cross-border ownership chains when the affiliates are located in different countries than their owner. Horizontal complexity pertains to the number of ownership links for a given affiliate. For example, in Diagram 1, affiliate M features the highest degree of horizontal complexity, with participations shared across three different affiliates (D, I and J). Within the group structure, affiliate E acts as an "ownership hub" as it controls several other affiliates (G, H and I)[6]. The mutual holding of participations between affiliates F and J illustrates cross-shareholding[7].

2.2 MNE structures and their determinants: empirical evidence

Several studies investigate the ownership chain structures of MNEs and their potential drivers.

Mintz and Weichenrieder (2010) analyse the relative importance of intermediate entities in German MNE ownership chains with particular focus on the role of conduits and holdings[8]. They rely on micro data for German FDI, available from the Bundesbank over the period 1989 - 2001. They first document the increasing relevance and complexity of intermediate entities for conducting German FDI abroad during the 1990s. In particular, the stock of total assets held by

[4] By definition, a conglomerate is a multi-industry company - *i.e.* a combination of multiple business entities performing different economic activities under one corporate group - usually involving a parent company and many affiliates.
[5] For instance, this maximum hierarchical level can regroup the ownership links of affiliates {B, E, G, K}, {B, E, H, L} or {B, E, I, M}.
[6] According to UNCTAD (2016), such a hub can be a holding corporation in a host country controlling several operating companies in the same host country; it can be a regional headquarters controlling companies in neighboring countries; it can be a divisional headquarters controlling companies in the same line of business; or it can be an intermediate entity performing specific functions for its controlled entities (*e.g.* intragroup lending, treasury management, debt issuance, *etc.*).
[7] UNCTAD (2016) notes that cross-shareholding can involve more than two companies in highly complex networks.
[8] See Chapter 4 "Holding Companies and Ownership Chains" in Mintz and Weichenrieder (2010). Mintz and Weichenrieder define holding and conduit companies as intermediate entities owning affiliates. While the holding company is located in the same country as the dependent affiliate, the conduit company is located in a third country.

intermediate entities increased substantially compared to other German-owned firms, while the number of both types of firm grew in similar proportions[9]. Regarding German outward FDI, the increased use of intermediate entities mainly comes from holding companies located in the host country of the final subsidiary than from conduit companies located in third countries. Indeed, over the 1990s, the total assets and total number of holding companies in German outward FDI increased[10] while for conduit companies only their total number rose (notably in NL[11]) but not their total assets[12]. On the contrary, for German inward FDI, foreign-owned firms operating in Germany held *via* conduit entities located in third countries (notably NL and LU)[13] increased all over the 1990s, whether in terms of total assets or number[14]. The study further shows that factors influencing complex ownership structures in German outward or inward FDI pertain to tax and non-tax motives. Tax motives cover withholding taxes on dividends, the possibility to consolidate profits and losses across a group's entities and the availability of a credit system concerning the taxation of foreign dividends. Non-tax motives include the economic size of the host country, its development level and the size of the subsidiary.

Lewellen and Robinson (2014) analyse the ownership structures of US MNEs and explore the determinants of internal ownership choices. Their sample cover confidential data about 1,354 major US MNEs and their 47,371 foreign entities in years 1994, 1999, 2004, and 2009, available from the Bureau of Economic Analysis (BEA)'s *Survey of US Direct Investment Abroad*. Firstly, they show that US MNEs choose to organise their foreign ownership in vastly different ways. About half of their sample firms are flat since having no cross-border ownership connections among their foreign affiliates, while the other half are complex as establishing cross-border ownership links. Within the latter sample, the level of complexity varies considerably across firms, and some firms appear extremely complex. Secondly, while the share of complex firms decreased between 1994 and 2009, MNEs still qualifying as complex are becoming increasingly more complex over that period. Lewellen and Robinson find that tax considerations, including minimisation of US tax on income earned abroad, as well as income withholding and capital taxes

[9] See Figure 4.2: The Number and Total Assets of German-owned Holding Companies, p. 84 in Mintz and Weichenrieder (2010).
[10] Ibid. Figure 4.3d, p. 86.
[11] Ibid. Figure 4.4: The Rise and Decline of Conduit Countries for German Outbound Investment, p. 93.
[12] Ibid. Figure 4.3b, p. 86.
[13] Ibid. Figure 4.6: "Market Shares" of Conduit Countries for German Inbound Investment, p. 98.
[14] Ibid. Figure 4.5: The Relative Importance of Ownership Chains (Inbound), p. 95.

imposed abroad, help to explain the structuring of the internal ownership chains of MNEs. In addition, non-tax motives also help to explain the internal ownership structure of MNEs but only to a lesser extent. Non-tax motives relate to political and expropriation risks, investment protection through international agreements (*e.g.* bilateral investment treaties (BITs)), financial exposure, financing strategies and the institutional environment of the host country. Economic ties - proxied by trade flows and geographical distances between countries along with dummy variables such as common language, common coloniser and common religion - also contribute to explain MNE ownership chains.

Dyreng *et al*. (2015) examine global equity ownership chains to explore how tax and non-tax country characteristics affect whether firms use foreign holding companies and where they locate them. Their dataset includes 916 publicly traded US MNEs from the Bureau Van Dijk's *Orbis* database with ownership structures spanning from the ultimate US parent firm down to the terminal subsidiaries. Explanatory tax variables come from the *Comtax* database. Non-tax variables stem from *Transparency International* (for country corruption) and *Political Risk Services* (for investment risk). Their model includes control variables that characterise the bilateral economic relationships between the US and their country counterpart in the ownership chains, including bilateral trade data and gravity variables (religion, legal origin, colonial links, contiguity and common language). They find that both tax and non-tax variables determine the use and location of foreign holding companies by US MNEs. The latter usually control equity in their foreign operating companies through foreign holding companies located in countries featuring light withholding tax rate on dividend distributions and less corruption and investment risks (*e.g.* investment expropriation) than the countries in which the operating companies they own are located.

UNCTAD (2016) analyse the determinants of MNE ownership structures[15]. The analysis relies on a sample of 320,000 MNEs, extracted from the Bureau Van Dijk's *Orbis* database in November 2015. UNCTAD shows that the complexity of MNE ownership structures is highly skewed. While MNEs are often presented as featuring complex and opaque structures, the majority of MNEs have simple structures. Almost 70% of MNEs have only one foreign affiliate, and almost

[15] See UNCTAD (2016), Chapter IV: Investor Nationality: Policy Challenges, p. 124-143 and notably "Section A. Introduction: the investor nationality conundrum" (p. 124-128) and "Section B. Complexity in MNE ownership structures" (p. 129-143).

90% of MNEs have fewer than five affiliates. Less than 1% of MNEs have more than 100 affiliates, but these account for more than 30% of all foreign affiliates and almost 60% of global MNE value added[16]. UNCTAD then focuses on the largest MNEs worldwide represented by the top 100 MNEs in the UNCTAD's Transnationality Index[17]. These MNEs have on average more than 500 affiliates, more than two thirds of which are overseas, distributed across more than 50 countries. For these MNEs, the average hierarchical depth (vertical complexity) is seven levels. In addition, their respective structures commonly feature ownership hubs, *via* holding companies located in jurisdictions that provide fiscal, regulatory or institutional benefits to investors. UNCTAD lists several business factors driving the complexity of MNE structures. They include (a) growth considerations in an environment of fierce competition pertaining to economic motives such as economies of scope and of scale, business development, quest of new markets or new resources, (b) growth considerations relating to haphazard or opportunistic motives, (c) vertical and geographical fragmentation of value chains, (d) strategic partnerships between firms, including joint ventures and mergers and acquisitions, (e) administrative heritage or gradual "sedimentation" of layers of ownership as systematic restructuring and rationalization of an MNE ownership structure can be costly. UNCTAD argues that the complexity of MNE structures is often the result of business factors and not exclusively related to excessive tax planning motives, opaque governance considerations or the concealment of beneficial ownership. Nonetheless, MNEs endeavour to shape their ownership structures in the most advantageous manner possible, with respect to governance, strategic, operational, fiscal and risk management perspectives.

Rungi *et al*. (2017) resort to network theory to analyse MNE ownership structures. They use the Bureau Van Dijk's *Orbis* database to investigate shareholding information on more than 53.5 million companies operating in 208 countries, which were active in 2015. In this sample, Rungi *et al.* identify 80% of stand-alone companies that do not participate in ownership networks and 20% of corporates involved in ownership structures. Amongst the firms involved in ownership structures, 6% engage in portfolio investment and 14% in direct investment. Amongst the firms involved in direct investment, parents represent 4% (of which 0.4% are MNEs[18]) and subsidiaries

[16] See Figure IV.6. Distribution of MNEs by size class (Percent), p.134 in UNCTAD (2016).
[17] UNCTAD computes a Transnationality Index (TNI) to rank MNEs. The index is an arithmetic mean of three ratios: the ratio of foreign assets-to-total assets, the ratio of foreign sales-to-total sales and the ratio of foreign employment-to-total employment. The term "foreign" means outside of the headquarters' home country.
[18] Rungi *et al.* (2017) define MNEs as corporations that control at least a foreign subsidiary that is located in a country different from the origin country of the parent.

9% (of which 1.41% are foreign subsidiaries). This suggests that complex structures, involving cross-border ownership chains are polarised amongst MNEs. This result is confirmed by network indicators measuring the distribution of ownership links across MNEs. Rungi *et al.* define a taxonomy of ownership chain archetypes for foreign subsidiaries, by distinguishing between indirect foreign, round-tripping and multiple passports. Indirect foreign entities belong to an ultimate parent company abroad, but indirect control is exerted through at least one domestic intermediate subsidiary. Multiple passport entities are subsidiaries whose control path involves more than one country before ending in the origin country of the parent. A round-tripping investment occurs when the investor channels capital abroad into an incorporated company, then starts an operation from that country and returns the capital back into the origin country in the form of a direct investment in another company. In terms of proportions, foreign subsidiaries feature primarily indirect foreign entities, followed by multiple passport entities and to a lesser extent round-tripping entities. Rungi *et al.* then test the determinants of complex structures by distinguishing between industrial and financial groups[19]. The determinants include characteristics of the respective origin country of the parent and of the subsidiary and encompass tax and non-tax factors. Tax determinants cover tax rates on commercial profits. Non-tax determinants include financial development and contract enforcement indicators, entry costs required to start a business in the country of a subsidiary as a percentage of income per capita, firm size, levels of GDP for both countries of parents and subsidiaries, and bilateral gravity control variables (*e.g.* geographical distances, economic and commercial agreements, and common institutions between parents and subsidiaries locations). Rungi *et al.* show that financial development, contract enforcement and taxation factors are significant for industrial groups. This is not the case though for financial groups, possibly because their corporate governance is mainly based on the possibility of exploiting financial gains, rather than on the necessity to coordinate productive activities. For industrial groups, lower financial and contractual frictions in the location of subsidiaries likely foster choices of indirect control (hence complex ownership). On the contrary, a parent is more likely to choose direct control of its subsidiaries (thus simple ownership) in presence of good institutions in its origin country. In addition, lower tax rates in the country of the parent discourage the establishment of indirect control on any subsidiary. On the contrary, higher tax rates in the country of subsidiaries foster indirect corporate control.

[19] Financial groups include banks, insurance, mutual funds, *etc*.

While the aforementioned studies favoured a top-down approach looking at all possible ownership links in a given corporate group, starting from the parent, Albrese and Casella (2019) adopts a bottom-up approach. They analyse the complexity of MNEs' ownership chains from the perspective of the individual affiliate and the host country rather than the parent and the investor country. They rely on a sample of 700,000 foreign affiliates of MNEs with an identified parent, extracted from the Bureau Van Dijk's *Orbis* database in November 2015. Albrese and Casella propose a taxonomy of ownership chain archetypes for foreign affiliates, including plain foreign, conduit structure, round-tripping and domestic hubs. Plain foreign occurs when both the direct and the ultimate owner are from the same foreign country. Conduit structures arise when direct and ultimate owners are from two different foreign countries. Round-tripping describes a situation where the affiliate is from the same country as the ultimate owner, while the direct owner is foreign; in other words, the parent invests domestically through a foreign intermediate subsidiary. Domestic hubs arise when foreign affiliates are directly owned by a domestic corporate entity, acting as domestic hub, while the ultimate owner, the MNE parent, is located in a different country. These archetypes share the following proportions in their sample: 60% for plain foreign, 30% for domestic hubs, 10% for conduits and 1% for round-tripping. Albrese and Casella show that these proportions may differ for specific geographical areas or countries and from the perspective of the direct owner or the ultimate owner[20].

3. Data and objective

3.1 Sample of S127 entities

The BCL collects balance sheet items data for captive financial institutions and money lenders (sector S127). The collection is limited to a sub-population of S127 corporations. Indeed, only corporations whose total balance sheet is at least equal to EUR 500 million must provide periodic reporting to the BCL[21]. The BCL does not collect data for S127 companies with balance sheets less than EUR 500 million.

[20] From the direct owner perspective, Albrese and Casella show that the most frequent archetypes in Luxembourg are round-tripping followed by conduit structures, plain foreign and domestic hubs. From the ultimate owner perspective, the most frequent archetypes in Luxembourg are domestic hubs followed by conduit structures, plain foreign and round-tripping. See "Figure 9: Top 20 largest investor countries by archetype: share of total", p. 17 in Albrese and Casella (2019).

[21] See BCL regulation 2011/8 dated 29 April 2011 and amended by the BCL regulation 2014/17 dated 21 July 2014.

Hence, owing to data availability, this paper limits its investigations to a sub-sample of the whole population of S127 firms. This sub-sample features S127 firms with at least EUR 500 million in total assets. As of Dec. 2018, this sub-sample represents about 5% of the total number of S127 firms in Luxembourg, and about 85% of total assets held by S127 firms in Luxembourg.

3.2 Objective

The BCL dataset utilised enables the observation of only a limited part of a MNE ownership structure. Indeed, it provides information about the total assets and total number of S127 entities resident in Luxembourg and whose total assets are at least equal to EUR 500 million. Data is available on a monthly frequency for the period December 2014 - December 2019. The start of this period corresponds to the implementation of the new international statistical standards (IMF (2009)'s BPM6). Although the period is relatively short, it is nevertheless difficult to extend the series retrospectively, given that statistical standards attached to the balance sheet reporting of S127 entities are different.

Against this background, the objective of the paper is to draw insights from the sector S127 in Luxembourg, based on available data. In particular, the paper investigates the contributors to the dynamics of the total assets and number of captive financial institutions and money lenders in Luxembourg across various dimensions. The latter include the main economic activities carried out by the groups owning S127 entities, the geographical location of headquarters owning S127 entities (or equivalently, the nationality of the groups), the geographical counterpart of the balance sheet of S127 entities, the balance sheet structure of S127 entities and the type of S127 firm. In addition, the paper addresses the new reporting and non-reporting motives driving the number of S127 entities in the data sample compiled by the BCL. The paragraph below provides detailed information about the sources used in the analysis.

3.3 Method and sources

Classification of the main economic activities

The classification of the main economic activities carried out by a corporate group owning S127 entities in Luxembourg follows the International Standard Industrial Classification of All Economic Activities (ISIC) Rev. 4 by UN (2008). The classification relies on the economic activities performed by the group. This information can be found in the annual accounts released by the corporate group whether in the Luxembourg Business Register or on the official website of the group. When a group performs more than two different economic activities, it is considered as a conglomerate operating in the industry, producing services or both, depending on its activities. When deemed necessary, the classification is crosschecked with additional sources publicly available.

Geographical location of headquarters or nationality of the groups

A headquarters (or parent) is located at the top of a group structure. It ensures corporate governance, takes strategic decisions and coordinates the important functions of an organization (*e.g.* strategic planning, corporate communications, tax, legal, marketing, finance, human resources, information technology and procurement). Although the latter functions can be located in a unique location, investigations shows that groups often separate their operational headquarters from their legal headquarters. The former can be deemed as the decision-making body shaping the economic strategy of the group while the latter determines the legal regime that applies to the group[22]. The paper focuses on the operational headquarters as representing the strategic economic decision body of a group.

The paper determines the geographical location of the operational headquarters based on the information provided by the annual accounts of the group available in the Luxembourg Business Register or on the official website of the group[23]. This information has been crosschecked with additional sources such as the Bloomberg company's profile[24] and the US Securities and Exchange Commission[25]. The latter proved very useful in tracing and determining the parent and its nationality for groups featuring complex structures. For the sake of robustness, the paper also controlled the nationality of the groups with complementary sources and notably the Global Legal

[22] The geographical location of legal headquarters often revolves around specific countries that provide more leeway as regards to the legal environment applying to a MNE. For example, many US multinational investment funds locate their operational headquarters in the US (often a financial centre such as New York to benefit from economies of scale and of scope) while locating their legal headquarters in the Cayman Islands (to benefit from the legal environment on investment funds).

[23] For groups featuring complex structures or releasing only a few official information, the determination of the group nationality can necessitate deeper investigations and be time-consuming.

[24] See https://www.bloomberg.com

[25] See https://www.sec.gov

Identifier Foundation data (GLEIF)[26], the EuroGroup's Register (EGR)[27] by Eurostat and the Register of Institutions and Affiliates Database (RIAD)[28]. Although the results correspond for a large majority of the groups, the aforementioned databases may provide a different nationality of the parent from the one found with the method favoured in this paper. This is due to methodological differences and data limitations. The former pertains to a lack of clear distinction between the operational and legal headquarters in the aforementioned databases and the latter to data unavailability.

Balance sheet counterparts, balance sheet structure, types of entities and new reporting/non-reporting motives

The information relating to the geographical counterpart of the balance sheet of S127 entities, the balance sheet structure of S127 entities, the type of S127 firm and the new reporting/non-reporting motives driving the number of S127 entities are available from the BCL. The latter collects data on balance sheet items for captive financial institutions and money lenders whose total assets are at least equal to EUR 500 million (see *infra*, section 3.1). The analysis on

[26] The Global Legal Entity Identifier Foundation (GLEIF, https://www.gleif.org/en/) provides data about group structures based on the Legal Entity Identifier (LEI) for any legal entity listed on a stock exchange or that issues equity securities or debt securities. The latter is a unique global identifier for legal entities participating in financial transactions. The LEI connects to key reference data that provides the information on a legal entity identifiable with an LEI. The information available with the LEI, *e.g.* the official name of a legal entity and its registered address, is referred to as "Level 1" data. It provides the answer to the question of "who is who". In addition, the LEI includes the "Level 2" data that answers the question of "who owns whom". Specifically, legal entities that have a LEI can report their direct accounting consolidating parent as well as their ultimate accounting consolidating parent. For more information, see https://www.gleif.org/en/lei-data/access-and-use-lei-data/level-2-data-who-owns-whom

[27] The EuroGroups Register (EGR) is the statistical business register of multinational enterprise groups having at least one legal unit in the territory of EU or EFTA countries. The EGR database contains information on the legal units (identification, demographic, control and ownership characteristics), the enterprises (identification and demographic characteristics, main activity code (NACE), number of persons employed, turnover, institutional sector) and the enterprise groups (identification characteristics, the structure of the group, the group head, the country of global decision centre, main activity code (NACE), consolidated employment and turnover of the group). See https://ec.europa.eu/eurostat/web/structural-business-statistics/structural-business-statistics/eurogroups-register

[28] According to Kropp *et al*. (2017), RIAD is a business register jointly operated by and accessible to all members of the European System of Central Banks (ESCB), namely the European Central Bank (ECB) and all National Central Banks (NCBs) in the EU, and the National Supervisors of countries participating in the Single Supervisory Mechanism (SSM). RIAD started as a statistical tool to maintain the list of Monetary Financial Institutions (MFIs). Throughout the years, the statistical populations covered in RIAD grew in line with expansions of the ECB's coverage of the financial sector in its statistical productions to also include investment funds, financial vehicle corporations engaged in securitization transactions, payment statistics relevant institutions and insurance corporations. Amongst the extensive set of attributes available in RIAD, the latter contains information about the various types of (capital) ownership and/or control relationships between a group's entities (in particular banking groups).

the type of S127 firm draws upon an earlier work by Di Filippo and Pierret (2020) on a typology of captive financial institutions and money lenders in Luxembourg.

4. Static analysis

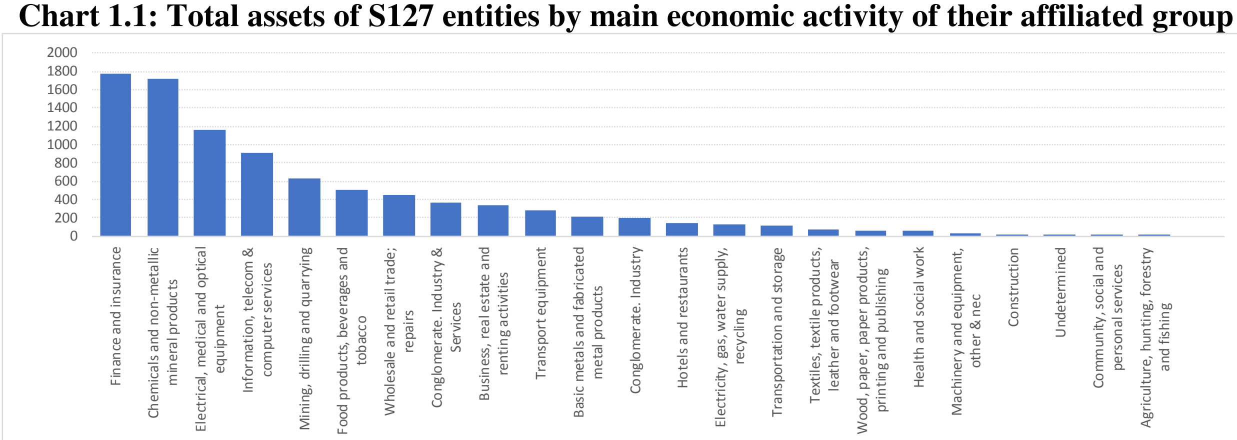
4.1 Main economic activity of groups resorting to S127 entities

4.1.1 Total assets

Chart 1.1 breaks down the total assets held by S127 entities by main economic activity performed by their respective affiliated group.

On average, over the period Dec. 2014 - Dec. 2019, total assets in S127 entities are owned by groups undertaking activities in "*Finance and insurance*" (19%), "*Chemicals and non-metallic mineral products*" (19%), "*Electrical, medical and optical equipment*" (13%), "*Information, telecommunications and computer services*" (10%), "*Mining, drilling and quarrying*" (7%), "*Food products, beverages and tobacco*" (6%) and "*Wholesale and retail trade; repairs*" (5%). Altogether, groups performing the aforementioned activities account for about 80% of the total assets held by S127 entities. The remaining 20% represent groups involved in other economic activities (Chart 1.1).

Chart 1.1: Total assets of S127 entities by main economic activity of their affiliated group



Source: Authors' calculations. Units: EUR billion. Average Dec. 2014 - Dec. 2019

By breaking down the main economic activity of groups owning the most important assets in S127 entities into sub-activities, we find that for "*Finance and insurance*", S127 entities holding the most important assets relate to investments funds (44%), followed by financial holdings owned by private families (26%), banks (16%), insurance (8%), other financial services including trading, listing, *etc*. (6%) and wealth-holding entities (0.2%).

For "*Chemicals and non-metallic mineral products*", assets held by S127 entities belong in majority to groups manufacturing pharmaceuticals (78%), followed by minerals (10%), chemicals (7%), rubber and plastic products (5%) and oil and gas (1%). The latter sub-category features a small proportion as it comprises only a limited part of the petrochemical industry *i.e.* groups involved only in the transformation of hydrocarbon products. The paper classifies groups engaged in the other stages of the hydrocarbon value chain – *i.e.* performing upstream, midstream and downstream activities – in the activities of mining, drilling and quarrying (see *supra*).

For "*Electrical, medical and optical equipment*", the major share of assets in S127 entities relates to manufacturers of electrical equipment (49%), closely followed by medical equipment (48%) and optical equipment (2%).

For "*Information, telecommunications and computer services*", S127 entities holding the majority of assets belong to groups performing telecommunication activities (55%), followed by computer services (24%) and information and media (21%).

For "*Mining, drilling and quarrying*", S127 entities owning a substantial part of assets are affiliated to petrochemical industries (48%). The latter perform upstream, midstream and downstream activities along the hydrocarbon value chain. They are closely followed by groups specialised in offshore and onshore drilling activities (43%) and by companies involved in the mining and quarrying of minerals (9%).

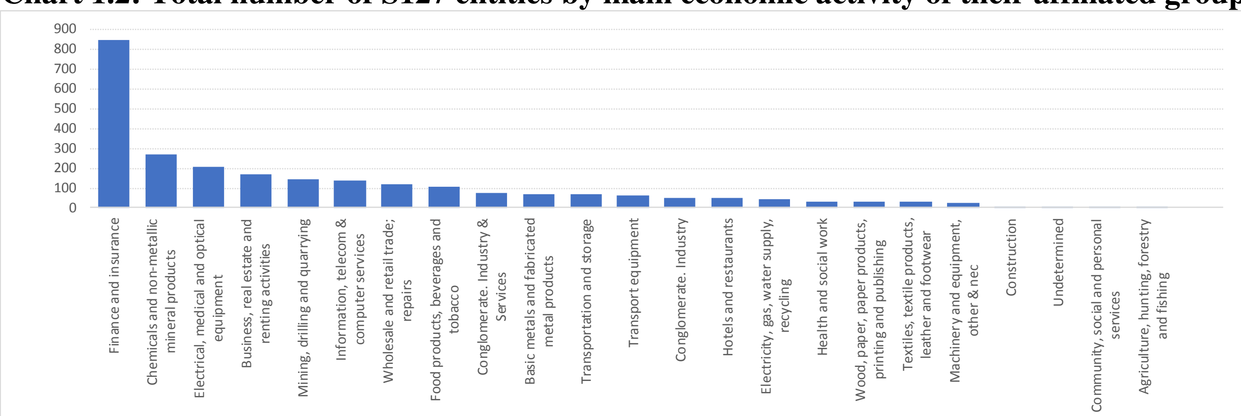
For "*Food products, beverages and tobacco*", the major asset holders in S127 entities are groups producing beverages (57%), whether alcoholic or non-alcoholic, followed by food products (43%) and tobacco (0.2%).

Overall, groups resorting to S127 entities perform various economic activities. Groups undertaking non-financial activities account for about 80% of the total assets held by S127 entities. The remaining share relates to groups involved in financial activities ("*Finance and insurance*").

4.1.2 Total number

Chart 1.2 breaks down the number of S127 entities by main economic activity carried out by their respective affiliated group. For each economic activity except "*Finance and insurance*", the relative proportions of the number of S127 entities broadly mimics those of total assets. However, the activity of "*Finance and insurance*" is singled out due to its ownership of the largest number of S127 entities in comparison to the other activities, especially "*Chemicals and non-metallic mineral products*" whose assets are worth the same on average over the period Dec. 2014 - Dec. 2019 (Chart 1.1). Thus, groups performing activities in "*Finance and insurance*" holds 33% of the total number of S127 entities whose total assets are at least equal to EUR 500 million, on average over the period Dec. 2014 - Dec. 2019. In addition, their share trends upward throughout the period, from 29% in Dec. 2014 to 40% in Dec. 2019. Within this category, groups owning the highest number of S127 entities are investments funds (63%), followed by financial holdings owned by private families (15%), banks (9%), insurance (7%), other financial services including trading, listing, *etc*. (6%) and wealth-holding entities (0.3%).

Chart 1.2: Total number of S127 entities by main economic activity of their affiliated group



Source: Authors' calculations. Units: Total number. Average Dec. 2014 - Dec. 2019

For the other economic activities, the average proportions over the period Dec. 2014 - Dec. 2019 are as follows: 10% for "*Chemicals and non-metallic mineral products*", 8% for "*Electrical, medical and optical equipment*"; 7% for "*Business, real estate and renting activities*"; 6% for "*Mining, drilling and quarrying*"; 5% each for "*Information, telecommunications and computer services*" and "*Wholesale and retail trade; repairs*"; and 4% for "*Food products, beverages and tobacco*". Altogether, groups performing the aforementioned economic activities (including "*Finance and insurance*") account for about 80% of the total number of S127 entities whose total assets are at least equal to EUR 500 million. The remainder represents groups involved in other economic activities (Chart 1.2).

Overall, groups undertaking non-financial activities hold about 70% of the total number of S127 entities. The remaining share relates to groups involved in financial activities ("*Finance and insurance*"). Notwithstanding this, investment funds appear as an important user of S127 entities in Luxembourg, whether in terms of total assets or number. This importance can relate to the fact that the country hosts one of the most important fund industry in the world. Indeed, the investment fund industry manages assets worth EUR 4,718 billion in Q4 2019 (EFAMA (2020)), placing Luxembourg as the leading investment fund centre in Europe and the second one at the global level, just behind the US where the fund industry manages assets equal to EUR 22,866 billion in Q4 2019[29]. In addition, S127 entities appear as a suitable tool for investment funds to structure their investments, notably in real estate or private equity (Hoor (2018)[30], Di Filippo and Pierret (2020)).

4.2 Geographical location of the headquarters

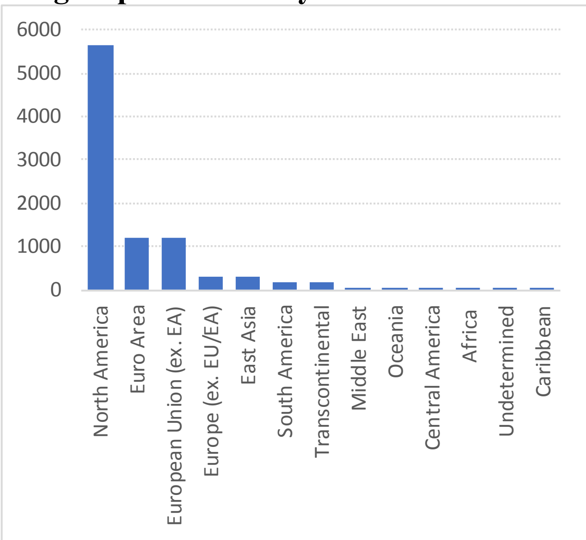
4.2.1 Total assets

Chart 2.1 breaks down the total assets of S127 entities by nationality of the groups' headquarters. The latter refers to the geographical location of the operational headquarters owning assets in S127 entities.

On average over the period Dec. 2014 - Dec. 2019, total assets of S127 entities are held by groups headquartered in North America (62%), Europe (30%) - of which euro area (13%)[31] - East Asia (3%) and the rest of the world (6%).

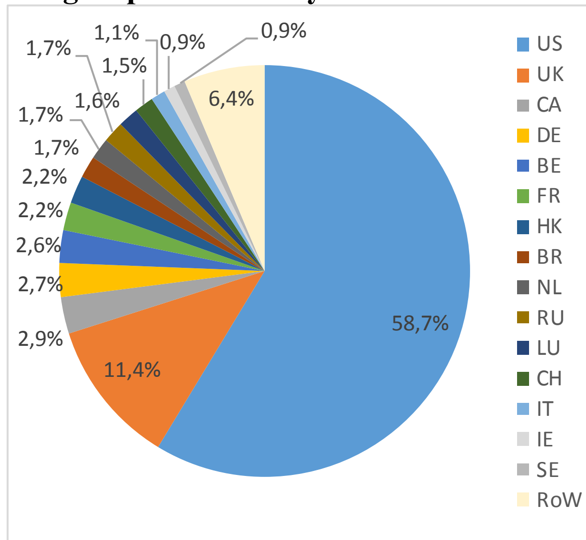
[29] See EFAMA (2020), Table 2 "Total net assets excluding funds of funds by the type of funds", millions of euro, end of quarter, Q4 2019 p. 10.
[30] See for example, Hoor (2018) p. 220.
[31] The paper breaks down the European area ("Europe") into three geographical zones: the euro area (which comprises euro area (EA) member states), the European Union (which regroups EU member states (including the UK), excluding EA member states) and Europe (which covers European countries, excluding EU and EA member states).

Chart 2.1: Total assets of S127 entities by groups' nationality: economic zones



Source: Authors' calculations. Units: EUR billion. Average Dec. 2014 - Dec. 2019

Chart 2.2: Total assets of S127 entities by groups' nationality: main countries



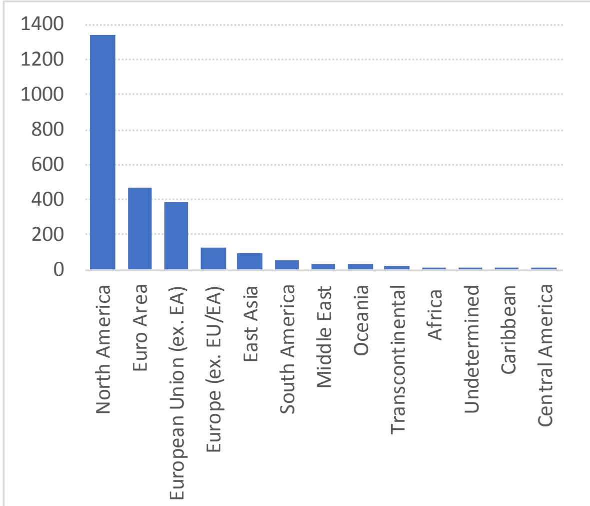
Source: Authors' calculations. Units: Percent. Average Dec. 2014 - Dec. 2019

Chart 2.2 provides a similar geographical breakdown by highlighting the most important countries. On average over the period Dec. 2014 - Dec. 2019, total assets of S127 entities are held by groups headquartered in the US (59%), the UK (11%), CA (3%), DE (3%), BE (3%), FR (2%), HK (2%), BR (2%), NL (2%), RU (2%), LU (2%), CH (1%), IT (1%), IE (1%) and SE (1%). Altogether, these countries own more than 90% of the total assets in the sample of S127 entities. The remainder represents the rest of the world.

4.2.2 Total number

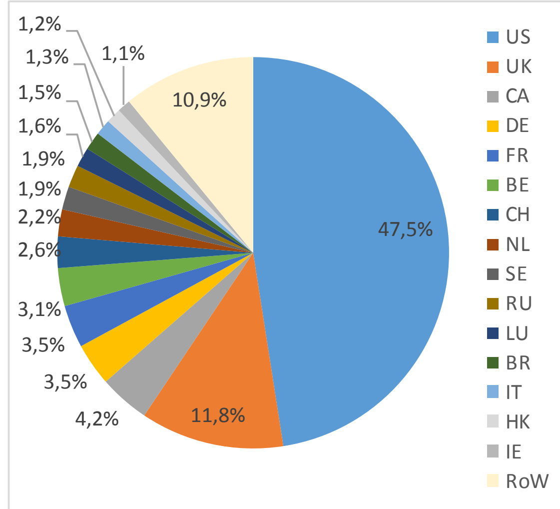
Chart 2.3 shows the number of S127 entities by nationality of the groups, based on the geographical location of the operational headquarters owning S127 entities. On average over the period Dec. 2014 - Dec. 2019, S127 entities belong to groups headquartered in North America (52%), Europe (38%) - of which euro area (18%) - East Asia (4%) and the rest of the world (7%).

Chart 2.3: Total number of S127 entities by nationality of the groups: economic zones



Source: Authors' calculations. Units: Total number. Average Dec. 2014 - Dec. 2019

Chart 2.4: Total number of S127 entities by nationality of the groups: main countries



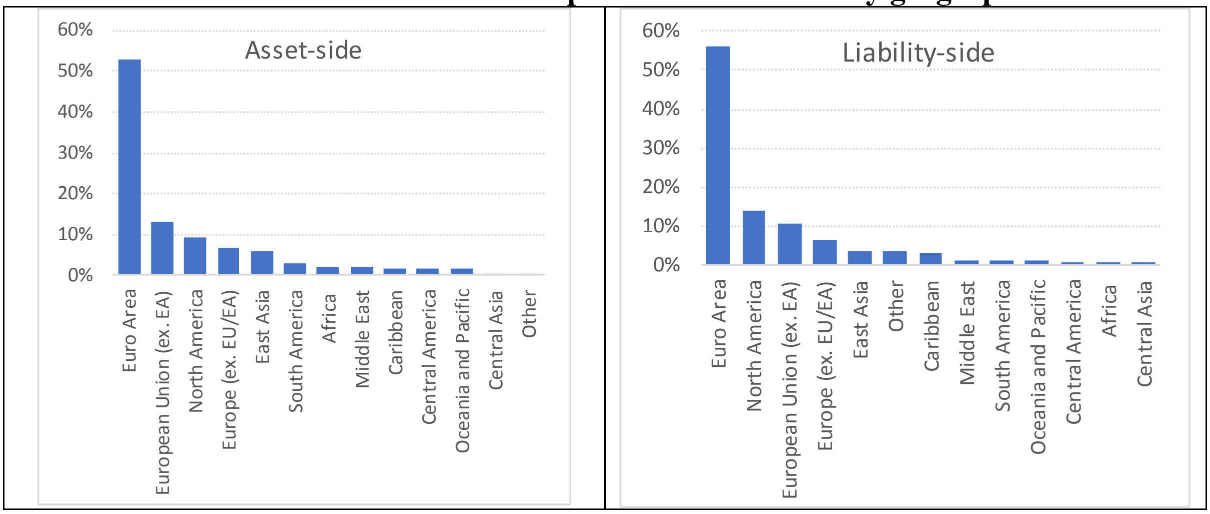
Source: Authors' calculations. Units: Percent. Average Dec. 2014 - Dec. 2019

Chart 2.4 provides a similar geographical breakdown by identifying the most important countries. On average over the period Dec. 2014 - Dec. 2019, the total number of S127 entities are held from groups headquartered in the US (48%), the UK (12%), CA (4%), DE (4%), FR (4%), BE (3%), CH (3%), NL (2%), SE (2%), RU (2%), LU (2%), BR (2%), IT (1%), HK (1%) and IE (1%). Altogether, these countries account for about 90% of the total number of S127 entities. The rest of the world holds the remainder.

4.3 Geographical counterpart of the balance sheet of S127 entities

Chart 3.1 contains the balance sheet counterpart of resident S127 entities across geographical areas. On the asset-side and on average over the period Dec. 2014 - Dec. 2019, shares amount to 73% for Europe (regrouping EA, EU and other European countries), 9% for North America and 6% for East Asia. On the liability-side, proportions amount to 73% for Europe, 14% for North America and 3% for East Asia. Overall, the euro area represents the predominant counterpart of the balance sheet of S127 firms. Indeed, counterparts located in the euro area account for 53% of the asset-side and 56% of the liability-side.

Chart 3.1: Balance sheet counterpart of S127 entities by geographical area



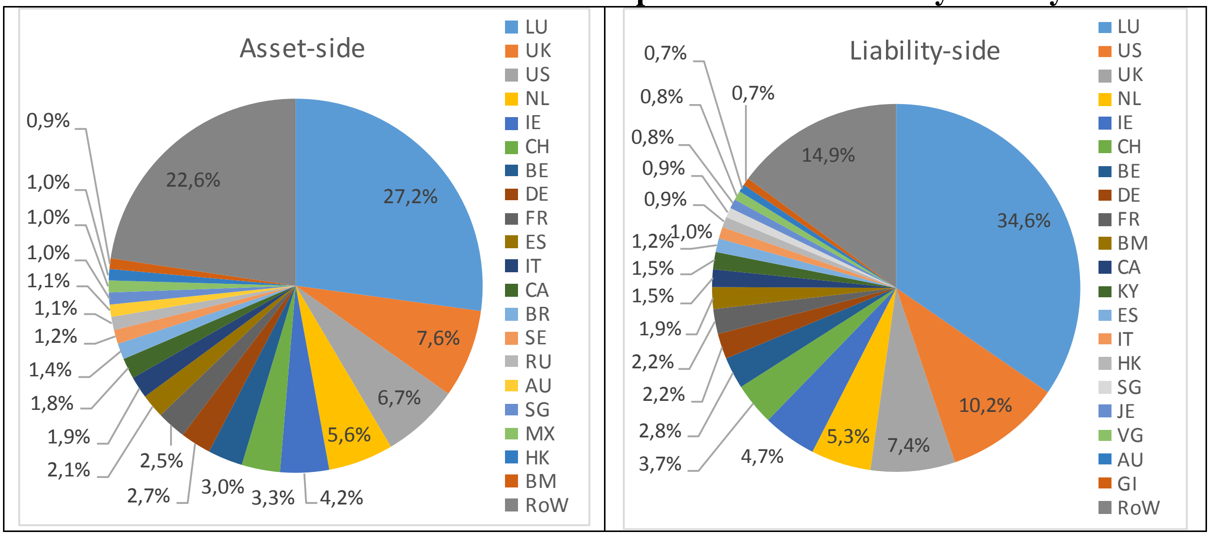
Source: Authors' calculations. Units: Percent. Average over the period Dec. 2014 - Dec. 2019

Chart 3.2 breaks down the balance sheet counterpart of S127 entities across countries. On average over the period Dec. 2014 - Dec. 2019, the most important counterpart for total assets and total liabilities held by S127 firms is Luxembourg. Its share accounts for about 27% on the asset-side and 35% on the liability-side. The relative importance of the domestic counterpart suggests that most MNEs own more than one S127 entity in Luxembourg[32]. This implies that MNEs own a network of captive financial institutions - potentially of different types and of different sizes - to finance their business activities and structure their strategic corporate investments.

Concerning foreign counterparts, the most important countries when considering both sides of the balance sheet are the US (8%), the UK (8%), NL (5%), IE (4%), CH (4%), BE (3%), DE (2%), FR (2%) and CA (2%). Altogether, most foreign counterparts share the common feature with Luxembourg of benefiting from the status of global financial centre. These centres are interconnected with financial flows intermediated *via* captive financial institutions in a global network.

[32] For more details, see Appendix A.

Chart 3.2: Balance sheet counterpart of S127 entities by country



Source: Authors' calculations. Units: Percent. Average over the period Dec. 2014 - Dec. 2019

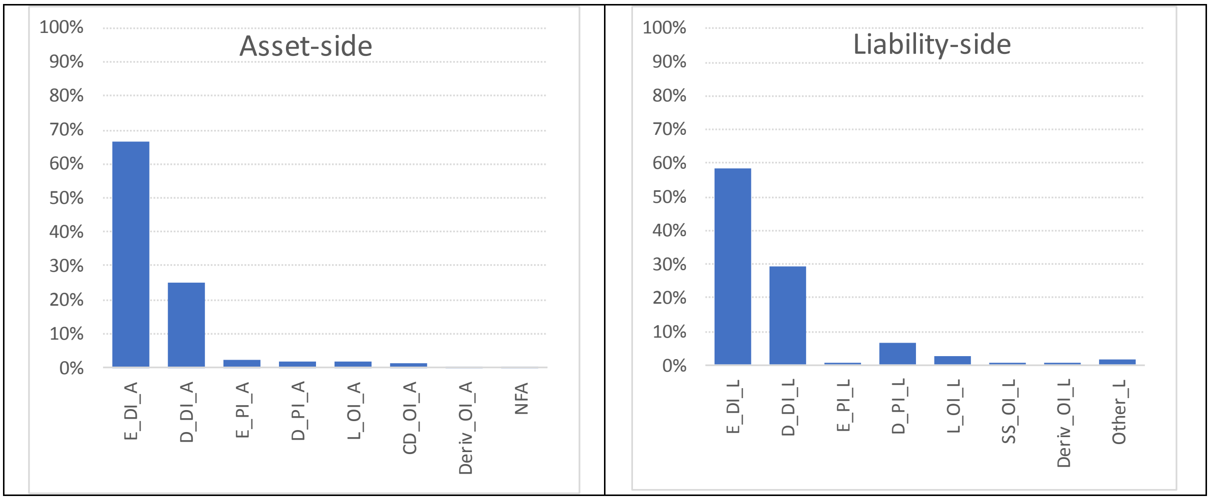
4.4 Balance sheet structure

Chart 4 decomposes the aggregate balance sheet of resident S127 entities by items, respectively on the asset-side (*A*) and on the liability-side (*L*).

The following items appear on both sides of the balance sheet: equity as direct investment (*E_DI_A*, *E_DI_L*) or as portfolio investment (*E_PI_A*, *E_PI_L*)[33], debt as direct investment (*D_DI_A*, *D_DI_L*) or as portfolio investment (*D_PI_A*, *D_PI_L*) and financial derivatives (*Deriv_OI_A*, *Deriv_OI_L*). The asset-side also includes currency and deposits (*CD_OI_A*) and non-financial assets (*NFA*). The liability-side covers extra-group loans (*L_OI_L*), short sales (*SS_OI_L*) and other liabilities (*Other_L*).

[33] To calculate debt as direct investment (*D_DI_A* and *D_DI_L*) and debt as portfolio investment (*D_PI_A* and *D_PI_L*), the paper uses intragroup loans and debt securities from the BCL database. Debt securities include hybrid and non-hybrid instruments. The paper considers non-hybrid debt securities as portfolio investment since they are negotiable financial instruments. Conversely, as hybrid debt securities are non-negotiable financial instruments, the paper classifies them in direct investment, along with intragroup loans. For more details, see Di Filippo and Pierret (2020).

Chart 4: Balance sheet structure of S127 entities



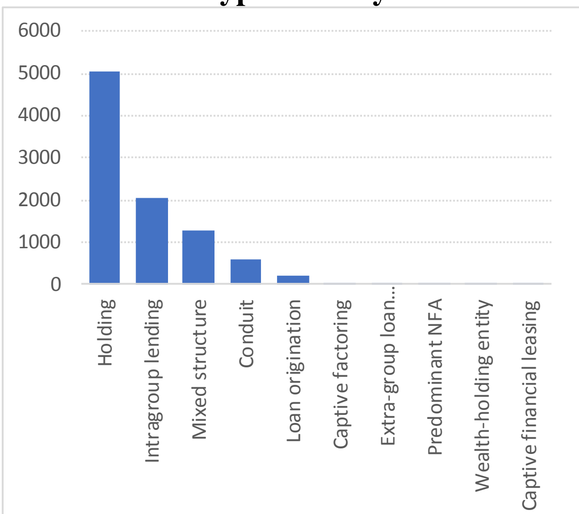
Source: Authors' calculations. Units: Percent. Average over the period Dec. 2014 - Dec. 2019

Chart 4 shows that equity and debt, both as direct investment, constitute the most important items on both sides of the aggregated balance sheet of S127 entities. This suggests that S127 entities mainly favour capital shares (equity as direct investment) and intra-group loans (debt as direct investment) as financing means. When these financial flows are cross-border, they are registered as foreign direct investment in the Balance of Payments of Luxembourg and its respective country counterparts.

4.5 Types of S127 entities

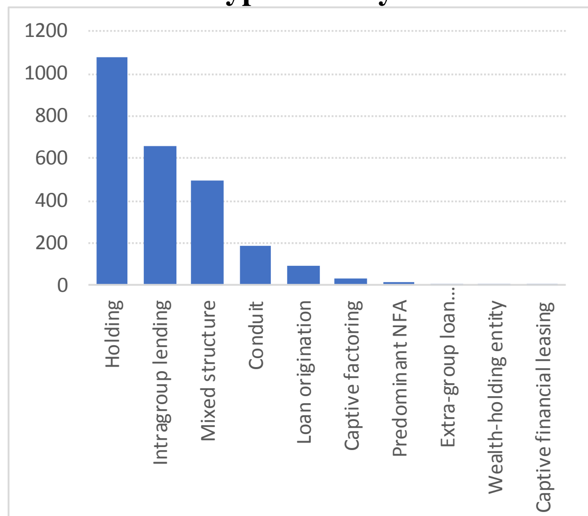
Chart 5.1 presents the total assets across types of S127 firm. On average over the period Dec. 2014 - Dec. 2019, the most important asset holders are holding corporations (55%), followed by intragroup lending companies (22%), mixed structures (14%), conduits (6%) and loan origination companies (2%). These corporations represent about 99% of the total assets held by S127 companies whose total assets are at least equal to EUR 500 million. The remaining types gather captive factoring and invoicing corporations, companies with predominant non-financial assets, extra-group loan origination firms, wealth-holding entities and captive financial leasing corporations.

Chart 5.1: Total assets of S127 entities by type of entity



Source: Authors' calculations. Units: EUR billion. Average Dec. 2014 - Dec. 2019

Chart 5.2: Total number of S127 entities by type of entity



Source: Authors' calculations. Units: Total number. Average Dec. 2014 - Dec. 2019

Chart 5.2 presents the number of S127 firms by type. On average over the period Dec. 2014 - Dec. 2019, the sample of S127 corporations comprises holding corporations (42%), intragroup lending companies (26%), mixed structures (19%), conduits (7%) and loan origination companies (4%). These corporations represent about 98% of the total number of S127 companies whose total assets are at least equal to EUR 500 million. The remaining types consist of captive factoring and invoicing corporations, companies with predominant non-financial assets, extra-group loan origination firms, wealth-holding entities and captive financial leasing corporations.

The relative importance of holding corporations and intragroup lending companies is in line with the relative importance of equity securities and debt instruments, both as direct investment, in the aggregated balance sheet of S127 entities (see *infra*). Indeed, holding corporations (respectively, intragroup lending companies) are characterized by the holding of a predominant share of equity (respectively, debt) as direct investment on both sides of their balance sheets[34].

[34] For more details, see Di Filippo and Pierret (2020).

5. Dynamic analysis

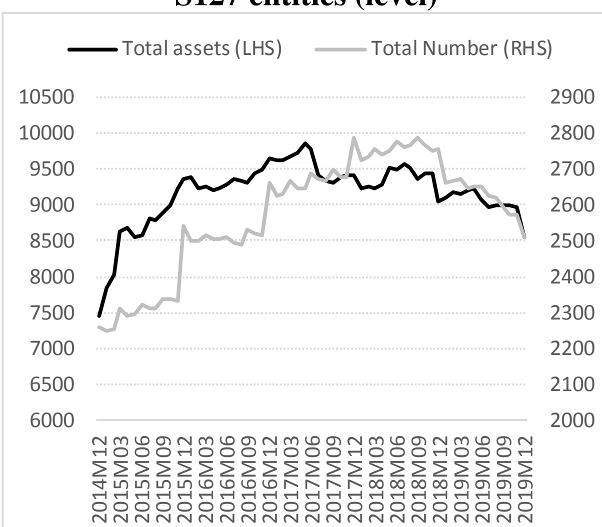
5.1 Macroeconomic level

Charts 6.1 and 6.2 present the evolution of the total assets and number of S127 entities, respectively in level and in year-on-year (YoY) variation over the period Dec. 2014 - Dec. 2019.

Total assets increased between Dec. 2014 and June 2017 (Chart 6.1), with an average year-on-year growth rate of 8% (Chart 6.2). Conversely, from July 2017 to Dec. 2019, total assets decreased (Chart 6.1), presenting an average year-on-year growth rate of -2% (Chart 6.2).

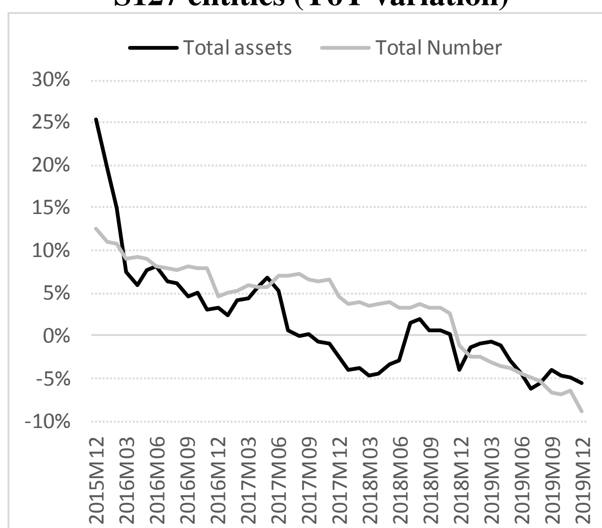
The number of S127 entities shares similar dynamics. It rose over the period Dec. 2014 - Nov. 2018 (Chart 6.1), with an average year-on-year growth rate of 6% (Chart 6.2). It lowered from Dec. 2018 to Dec. 2019 (Chart 6.1), presenting an average year-on-year growth rate of -5% (Chart 6.2).

Chart 6.1: Total assets and total number of S127 entities (level)



Source: BCL. Unit: EUR billion for Total assets

Chart 6.2: Total assets and total number of S127 entities (YoY variation)



Source: BCL. Unit: Percentage

A natural question that follows concerns the potential contributors to the aforementioned dynamics. Sections 5.2 to 5.6 analyse the main contributors to the evolution of total assets and number of S127 entities across various dimensions.

5.2 Main economic activity of groups resorting to S127 entities

Chart 7.1 presents the contribution to the year-on-year variation of total assets held by S127 entities by main economic activity carried out by their respective affiliated group. The contribution of groups to the evolution of total assets differs in terms of magnitude and sign over time, depending on their economic activity. This result holds throughout the period whether when total assets feature a positive trend (Dec. 2014 - June 2017) or a negative trend (July 2017 - Dec. 2019). In spite of these differences, several patterns emerge.

The main contributors to the evolution of total assets are S127 entities whose groups undertake activities in "*Chemicals and non-metallic mineral products*" (in particular pharmaceutical industries[35]), "*Finance and insurance*" (notably investments funds[36]), "*Electrical, medical and optical equipment*" (especially electrical equipment [37]), "*Information, telecommunications and computer services*" (notably computer services[38]), and "*Food products, beverages and tobacco*" (in particular groups producing beverages[39]).

On average over the period Dec. 2014 - June 2017, the largest contributors to the increase in total assets are S127 entities whose groups perform activities in "*Electrical, medical and optical equipment*" (in particular electrical and medical equipment), "*Chemicals and non-metallic mineral products*" (notably pharmaceutical industries), "*Food products, beverages and tobacco*" (notably food products [40]), "*Finance and insurance*" (especially investment funds) and "*Transport equipment*". During this period, some groups contributed to lower total assets in S127 entities. This is notably the case of groups involved in banking activities, basic metals and fabricated metal products, the mining of minerals[41] and computer services.

On average over the period July 2017 - Dec. 2019, the largest contributors to the decrease in total assets are S127 entities whose groups carry out activities in "*Chemicals and non-metallic mineral products*" (notably pharmaceuticals[42]), "*Mining, drilling and quarrying*" (especially, petrochemicals and offshore/onshore drilling industries[43]) and "*Food products, beverages and*

[35] See Chart B.1 in Appendix B.
[36] See Chart B.3 in Appendix B.
[37] See Chart B.2 in Appendix B.
[38] See Chart B.5 in Appendix B.
[39] See Chart B.4 in Appendix B.
[40] See Chart B.4 in Appendix B.
[41] See Chart B.6 in Appendix B.
[42] See Chart B.1 in Appendix B.
[43] See Chart B.6 in Appendix B.

tobacco" (in particular beverages[44]). During this period, some groups contributed to increase total assets. This is notably the case of groups involved in the following activities: investment funds, computer services, insurance, medical equipment, real estate activities and food products.

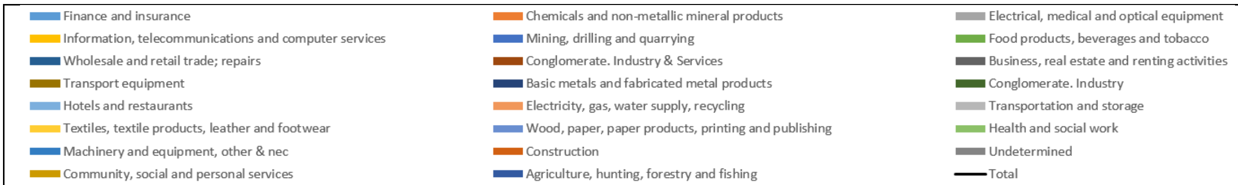
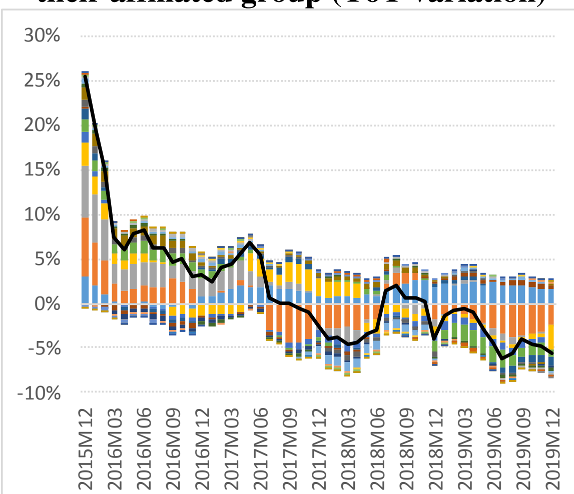
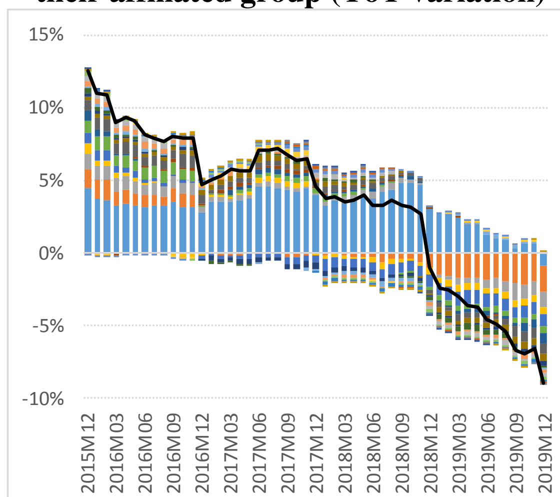


Chart 7.1: Contribution to total assets of S127 entities by main economic activity of their affiliated group (YoY variation)



Source: BCL, authors' calculations. Unit: Percent

Chart 7.2: Contribution to total number of S127 entities by main economic activity of their affiliated group (YoY variation)



Source: BCL, authors' calculations. Unit: Percent

Chart 7.2 presents the contribution to the year-on-year variation of the number of S127 entities by main economic activity performed by their respective affiliated group.

The main contributors to the evolution of the number of S127 entities are groups whose activities relate to "*Finance and insurance*" (notably investments funds[45]), "*Chemicals and non-metallic mineral products*" (in particular pharmaceutical industries[46]), "*Mining, drilling and quarrying*" (especially petrochemicals[47]), "*Electrical, medical and optical equipment*" (notably

[44] See Chart B.4 in Appendix B.
[45] See Chart C.3 in Appendix C.
[46] See Chart C.1 in Appendix C.
[47] See Chart C.6 in Appendix C.

electrical equipment[48]), "*Business, real estate and renting activities*" (especially real estate activities) and "*Food products, beverages and tobacco*" (in particular food products[49]).

On average over the period Dec. 2014 - Nov. 2018, the largest contributors to the increase in the number of S127 entities are groups involved in activities of "*Finance and insurance*" (notably investment funds), "*Electrical, medical and optical equipment*" (especially electrical equipment), "*Business, real estate and renting activities*" (in particular real estate activities) and "*Food products, beverages and tobacco*" (notably food products[50]). During this period, some groups contributed to lower the number of S127 entities. This is the case of groups performing the following activities: mineral mining, manufacturing of metal products, pharmaceuticals, banking activities, telecommunications and hotels and restaurants.

Over the period Dec. 2018 - Dec. 2019, a large majority of groups contributed to diminish the number of S127 entities though with different magnitudes (Chart 7.2). The most important contributors are groups performing activities in "*Chemicals and non-metallic mineral products*" (in particular pharmaceuticals[51]) and "*Mining, drilling and quarrying*" (notably petrochemicals and offshore/onshore drilling corporations[52]). Only the investment fund industry contributes to rein in the decrease in the total number of S127 entities, although slowing down its new creations of S127 entities.

5.3 Geographical location of the headquarters

Charts 8.1 to 8.4 present the contribution to the year-on-year variation of total assets and total number of S127 entities by nationality of the groups or equivalently by geographical location of operational headquarters owning S127 entities. While Charts 8.1 and 8.2 focus on the geographical areas, Charts 8.3 and 8.4 present a geographical breakdown for the most important countries, in terms of contribution.

[48] See Chart C.2 in Appendix C.
[49] See Chart C.4 in Appendix C.
[50] See Chart C.4 in Appendix C.
[51] See Chart C.1 in Appendix C.
[52] See Chart C.6 in Appendix C.

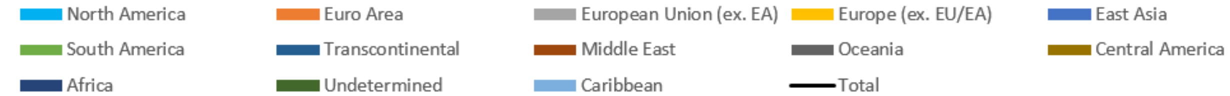
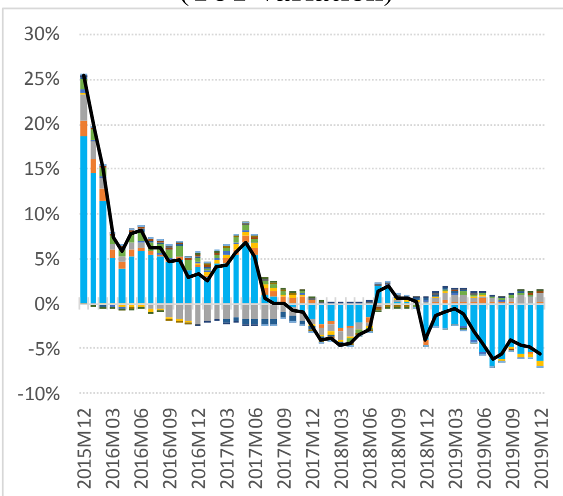
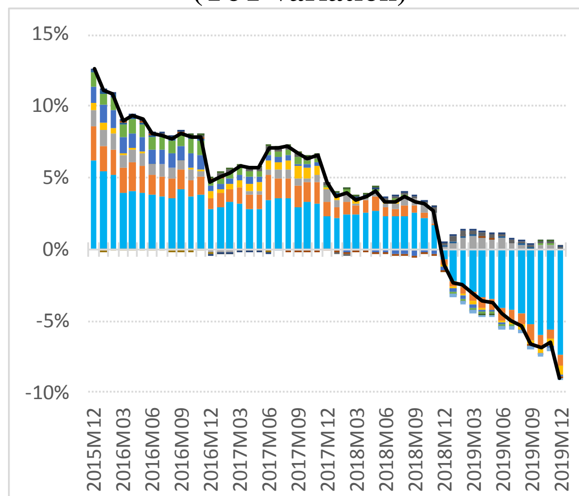


Chart 8.1: Contribution to total assets of S127 entities by group nationality (YoY variation)



Source: BCL, authors' calculations. Unit: Percent

Chart 8.2: Contribution to total number of S127 entities by group nationality (YoY variation)



Source: BCL, authors' calculations. Unit: Percent

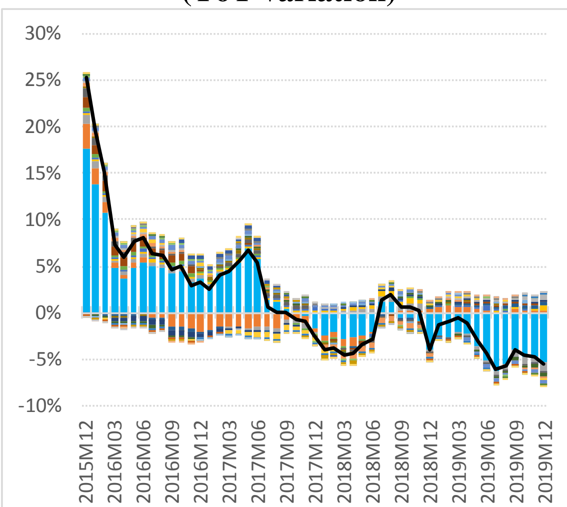
Whether for the total assets or the number of S127 entities, the main contributors are groups headquartered in North America (notably the US and CA), followed by the euro area (notably DE, FR, NL, BE, LU, IE and IT) and other European countries (in particular the UK, CH and SE). BR, RU and HK also feature a certain relevance but only to a lesser extent. The contribution of groups to the evolution of total assets and the number of S127 entities can differ in terms of magnitude and sign over time.

The most important contributors to the increase in total assets over the period Dec. 2014 - June 2017 are groups headquartered in the US, followed by BR, NL, CA, FR, IE and DE (Chart 8.3). Over this period, some important contributors lowered their total assets (notably the UK, LU, HK and CH). The UK (in orange) is singled out as its total assets decreased more substantially than other countries, from July 2016 onwards, a period that followed the Brexit vote of June 2016.

The most important contributors to the decrease in total assets over the period July 2017 - Dec. 2019 are groups headquartered in the US, followed by IE, the UK, CA, NL and CH. Over this period, some important contributors increased their total assets (notably DE, SE, LU, BE, HK and IT). Chart 8.3 shows that groups headquartered in the US initiated a first decreasing phase of their assets from Dec. 2017 to June 2018. A period that follows the US Tax Cuts and Jobs Act

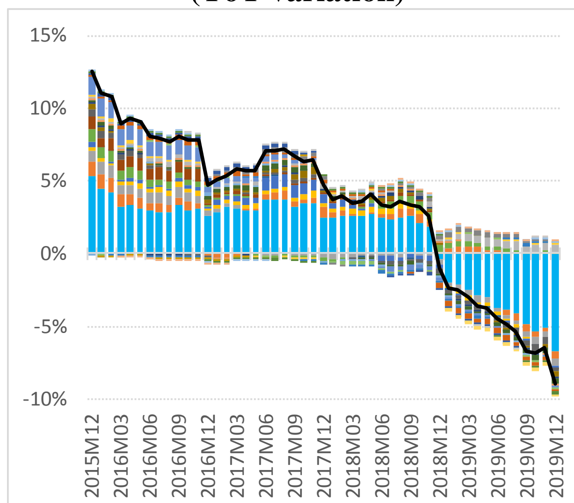
(TCJA) which came into effect in January 2018 (Kopp *et al*. (2019)). A second decreasing phase instigated by the US - relatively more substantial - occurs between Sep. 2018 and Dec. 2019.

Chart 8.3: Contribution to total assets of S127 entities by group nationality (YoY variation)



Source: BCL, authors' calculations. Unit: Percent

Chart 8.4: Contribution to total number of S127 entities by group nationality (YoY variation)



Source: BCL, authors' calculations. Unit: Percent

Regarding the number of S127 entities (Chart 8.4), their increase over the period Dec. 2014 - Nov. 2018 is primarily driven by US groups, followed by groups headquartered in the UK, BR, DE, BE, FR, CA, RU, SE, CH, NL, IE and LU. The largest contributors to the decrease in the number of S127 entities (Dec. 2018 - Dec. 2019) are US groups, followed by corporations headquartered in CA, NL, CH, DE, RU, LU, BE and IT. Over this period, some important contributors increased their number of S127 entities (notably SE and FR).

Overall, S127 entities belonging to groups headquartered in the US are the main driver of the decrease in total assets and total number of captive financial institutions in Luxembourg. This decrease notably follows the US TCJA that came into force on January 2018.

This observation is in line with results available in the literature (OECD (2018), BCL (2019), IMF (2019)[53], ECB (2020)). For example, IMF (2019) mentions that in response to the US

[53] See IMF (2019), "Box 1.2. The Decline in World Foreign Direct Investment in 2018", p. 38-40.

TCJA, which eliminated taxes on repatriated earnings by US multinationals, the latter repatriated accumulated prior earnings of their foreign affiliates, thus inducing a fall in the total assets of their foreign affiliates. IMF adds that over the period 2011–2017 these multinationals, on average, retain most of their earnings abroad and reinvested in their overseas affiliates[54]. This in turn can explain the increasing phase in total assets of S127 entities, driven in majority by US groups, from Dec. 2014 to July 2017 (Chart 8.3). Hence, the evolution of total assets held by S127 entities owned by US groups reflects financial operations by large US multinational corporations.

These operations were not limited to Luxembourg. Rather, they have been evidenced in other financial centres as well, and notably in CH and NL. For example, DNB (2019) mentions that the US corporation tax cuts made in early 2018 led a number of large, mainly US-based multinationals, to simplify their international group structure by liquidating Dutch and foreign intermediate holdings. Similarly, SNB (2019) notes that the US tax reform led foreign-controlled finance and holding companies domiciled in Switzerland to reduce their balance sheets[55].

Beyond the US tax shock, IMF (2019) and BCL (2019, 2020)[56] also mention that the decrease of the total assets and the number of S127 entities in Luxembourg may also relate to changes in the international regulatory framework implied by the OECD's base erosion and profit shifting initiatives (BEPS) and the ensuing European Union's Anti-Tax Avoidance Directives.

In the case of Luxembourg, it is worth noticing that the decrease in total assets and number of S127 entities owned by US groups at the aggregate (macro) level conceals differences at the group (micro) level. Indeed, during the decreasing phase, some US groups increased their total assets and number of S127 entities while others left them unchanged[57]. This suggests that, at the micro level, either the US TJCA did not affect all US groups equally or that other counterbalancing forces may be at play.

[54] IMF (2019) specifies that earnings by foreign affiliates can be repatriated to the parent company in the form of dividends or reinvested in the foreign affiliate. Both types of earnings are reflected as primary income in the current account, and reinvested earnings are counted as new FDI abroad (a financial outflow).

[55] During this period, the repatriation of accumulated foreign earnings by US-based parent companies of multinational enterprises did not affect all financial centres equally. According to Emter *et al*. (2019) and Di Nino and Semjonovs (2020), in Ireland for example, the retrenchment of gross FDI inflows and outflows primarily concerned transactions with other euro area financial centres (and not the US) and materialised earlier, starting from Q4 2017. Di Nino and Semjonovs (2020) argue that given the complex structure of the global FDI network, a possible narrative consistent with this evidence is that some repatriation of profits from Ireland might have occurred *via* other euro area financial centres.

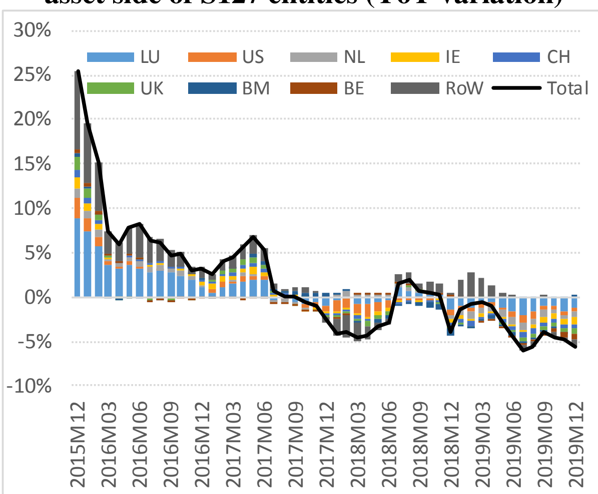
[56] See BCL (2019), "Chapitre 1.2.8.2. Le compte financier de la balance des paiements", p.73 and BCL (2020), "c) Baisse des investissements directs étrangers", p. 26-27.

[57] See Appendix D.

5.4 Geographical counterpart of the balance sheet of S127 entities

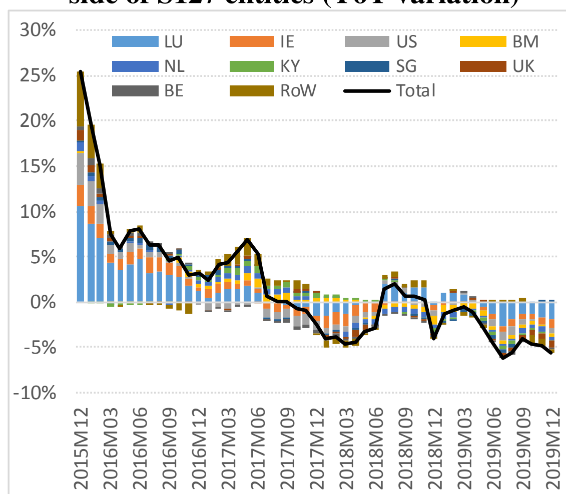
Charts 9.1 and 9.2 breaks down the evolution of the balance sheet of S127 entities by countries that are the most important counterparts over the period Dec. 2014 - Dec. 2019. The other countries fall under the category "*rest of the world*" (RoW).

Chart 9.1: Main counterparts on the asset side of S127 entities (YoY variation)



Source: BCL, authors' calculations. Unit: Percent

Chart 9.2: Main counterparts on the liability side of S127 entities (YoY variation)



Source: BCL, authors' calculations. Unit: Percent

The contribution of country counterparts to the evolution of total assets and liabilities of S127 entities can differ in terms of magnitude and sign over time.

On the asset-side (Chart 9.1), the most important contributor is Luxembourg (LU). It is followed by the US, NL, IE, CH, the UK, BM and BE. During the expansion phase (Dec. 2014 - June 2017), the most important contributors were LU, the US, NL, IE, CH and the UK. During the decreasing phase (July 2017 - Dec. 2019), the most important contributors were LU, the US, IE, CH, NL, the UK and BM.

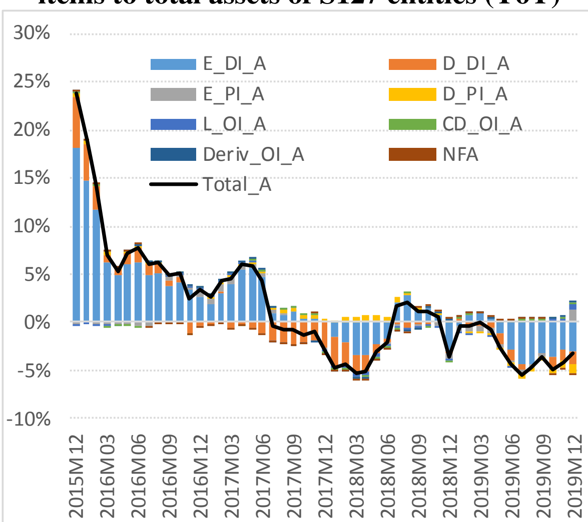
On the liability-side (Chart 9.2), the most important contributor is Luxembourg (LU). It is followed by IE, the US, BM, NL, KY, CH, SG, the UK and BE. During the expansion phase (Dec. 2014 - June 2017), the most important contributors were LU, IE, the US, SG, CH, NL, BM, BE, KY and the UK. During the decreasing phase (July 2017 - Dec. 2019), the most important contributors were IE, the US, LU, NL, BE, CH, the UK, BM and SG.

Overall, the same set of country counterparts (notably, LU, the US, IE, NL, the UK and CH) contributes to the expansion and decreasing phases, whether for the total assets or the number of S127 entities. This observation suggests that this set of countries are interconnected with financial flows intermediated *via* captive financial institutions in a global network.

5.5 Balance sheet structure

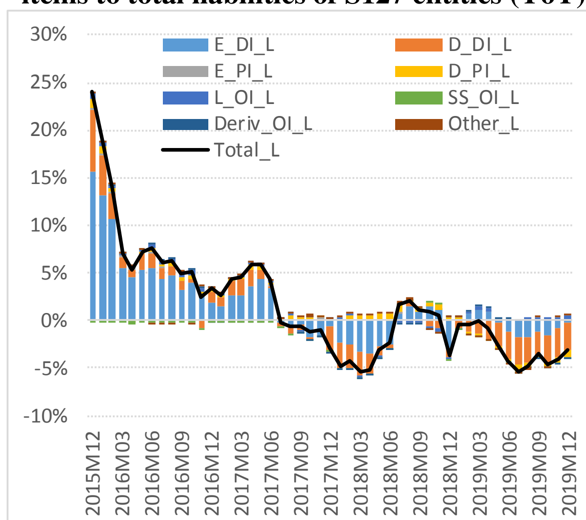
Charts 10.1 and 10.2 present the contribution to the evolution of total assets and total liabilities of S127 entities by balance sheet item.

Chart 10.1: Contribution of balance sheet items to total assets of S127 entities (YoY)



Source: BCL, authors' calculations. Unit: Percent

Chart 10.2: Contribution of balance sheet items to total liabilities of S127 entities (YoY)



Source: BCL, authors' calculations. Unit: Percent

On both sides of the balance sheet, the main items contributing to the evolution of total assets and total liabilities are equity and debt, both as direct investment. Equity contributed in majority to the expansion phase of total assets and total liabilities over the period Dec. 2014-June 2017. Conversely, both equity and debt act as important contributors to the decreasing phase of total assets and total liabilities (July 2017-Dec. 2019).

5.6 Types of S127 entities

Charts 11.1 and 11.2 present the contribution to the evolution of total assets and total number of S127 entities by type of firm.

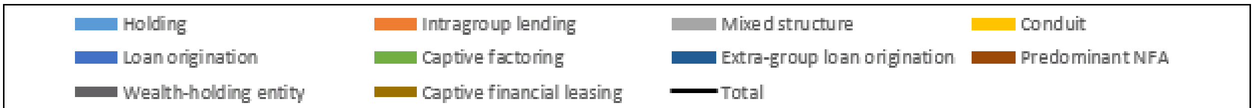
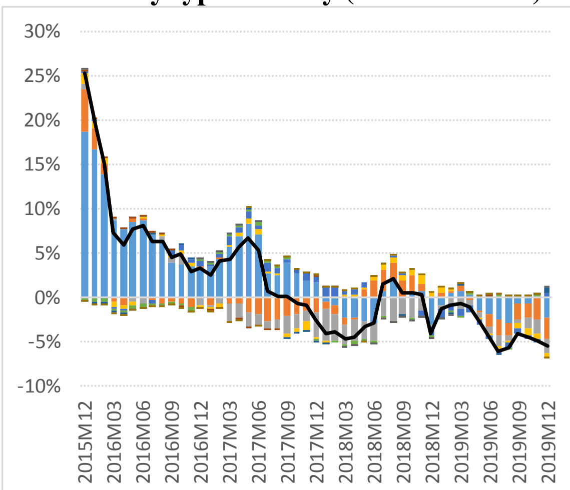
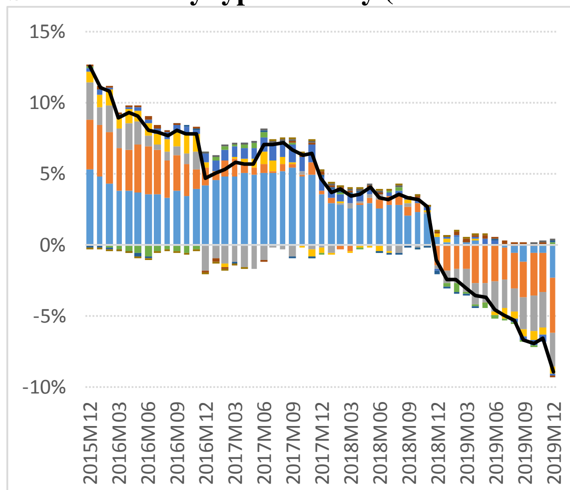


Chart 11.1: Contribution to total assets of S127 entities by type of entity (YoY variation)



Source: BCL, authors' calculations. Unit: Percent

Chart 11.2: Contribution to total number of S127 entities by type of entity (YoY variation)



Source: BCL, authors' calculations. Unit: Percent

The major contributors to the evolution of total assets and the number of S127 entities are holding companies, intragroup lending corporations and mixed structures.

On average over the period Dec. 2014 - June 2017, the largest contributors to the increase in total assets (Chart 11.1) are holding corporations. During this period, mixed structures, captive factoring and invoicing companies and intragroup lending companies lowered their total assets. Over the period July 2017 - Dec. 2019, the major contributors to the decrease in total assets are mixed structures and intragroup lending companies. Holding corporations, captive factoring and invoicing firms and loan origination companies lowered their total assets only to a lesser extent. The other types contributed positively to the evolution of total assets.

Concerning the number of S127 entities (Chart 11.2), the largest contributor to its increase over the period Dec. 2014 - Nov. 2018 relates to holding corporations. During this period, the number of captive factoring and invoicing companies lowered. Over the period Dec. 2018 - Dec. 2019, intragroup lending companies and mixed structures contributed most to the decrease in the total number of S127 entities. The number of holding corporations, conduits, captive factoring and invoicing firms and loan origination companies declined, but only to a lesser extent. The other types contributed positively to the number of S127 entities.

5.7 New reporting *versus* non-reporting motives

Chart 12 presents the number of S127 entities whose motives of new reporting or non-reporting implies a variation in the total number of S127 entities reporting to the BCL over the sample period. For the sake of clarity, the chart reports figures for each quarter over the period Q1 2015 – Q4 2019.

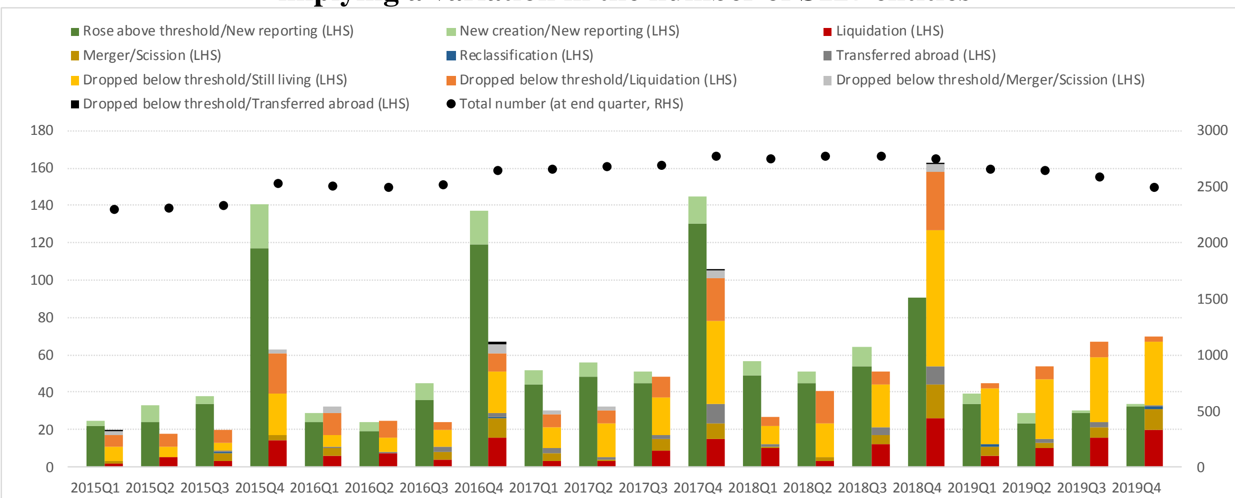
New reporting motives pertain to an entry into the BCL scope of any S127 entity. They regroup the new creations of S127 entities with total assets larger than EUR 500 million ("New creation/New reporting") and S127 entities created in the past and whose total assets rose above the EUR 500 million threshold over the considered period ("Rose above threshold/New reporting").

Non-reporting motives relate to S127 entities that fall outside the BCL scope. They include the liquidation of a company ("Liquidation"), the merger or scission of a company ("Merger/Scission"), the transfer abroad ("Transferred abroad"), the reclassification of a S127 entity ("Reclassification") into another sector (*e.g.* mutual fund, reinsurance company, securitization vehicle, *etc.*). Non-reporting motives also cover S127 entities whose total assets decreased below the EUR 500 million threshold over the period. For the latter, the paper investigates their current status by specifying whether they are still in operation ("Dropped below threshold/Still living"), have been liquidated ("Dropped below threshold/Liquidation"), transferred abroad ("Dropped below threshold/Transferred abroad") or experienced a merger/scission ("Dropped below threshold/Merger/Scission"). This investigation uses the information provided by companies in the Luxembourg Business Register.

Chart 12 also states the total number of S127 entities falling under the BCL scope at the end of each quarter, with a black dotted line. Thus, the variation of the black dotted line corresponds to the difference between the number of new reporting *versus* non-reporting S127 entities. If the number of new reporting entities is larger than the number of non-reporting entities, then the total number of S127 entities reporting to the BCL increases and *vice versa*.

During the expansion phase in the number of S127 entities (Q1 2015 – Q3 2018), the number of new reporting motives and hence the entry of S127 entities into the BCL scope exceeds the number of non-reporting motives by S127 firms that fall outside the BCL scope. The main new reporting motive driving this expansion relates to S127 entities created earlier and whose total assets rose above the EUR 500 million threshold over the period under review ("Rose above threshold/New reporting").

Chart 12: New reporting *versus* non-reporting motives implying a variation in the number of S127 entities



Source: BCL, RCS, authors' calculations. Unit: Number of S127 entities

During the decreasing phase in the number of S127 entities (Q4 2018 – Q4 2019), the number of non-reporting motives by S127 firms that fall outside the BCL scope exceeds the number of new reporting motives and hence the entry of S127 entities into the BCL scope. On the one hand, the number of S127 entities created earlier and whose total assets rose above the EUR 500 million threshold over the considered period fell. On the other hand, the most important non-reporting motives driving the decreasing phase pertain to S127 entities that dropped below the EUR 500 million threshold but are still in operation (in yellow) and to liquidations of S127 entities. The latter relates to liquidations of S127 entities with total assets greater than EUR 500 million (in red) and to S127 entities that lowered their assets and dropped below the EUR 500 million threshold, before their liquidation (in orange)[58].

[58] Note that the paper compares the new reporting/non-reporting motives only with the total number of S127 entities and not with the total assets held by S127 entities. Indeed, the assessment of the contribution of new reporting/non-reporting motives to the variation of total assets is made relatively more difficult by the fact that S127 entities entering the BCL scope (respectively, exiting the BCL scope) increase (respectively, decrease) their total assets gradually over a period that can differ across S127 entities. This gradual adjustment in total assets in turn renders it difficult to assess the actual contribution of the new reporting/non-reporting motives to the variation of total assets.

6. Conclusion

The paper provides insights into captive financial institutions and money lenders (sector S127) in Luxembourg. To this end, it exploits two metrics: the total assets and the total number of S127 entities. The paper analyses the evolution of both metrics across various dimensions: by main economic activity performed by the groups owning S127 entities, by nationality of the groups, by geographical counterpart of the balance sheet of S127 entities, by balance sheet item and by type of S127 firm. The paper undertakes both a static and a dynamic analysis. In the latter, it breaks down the evolution of total assets and total number of S127 entities across the aforementioned dimensions. The period covers Dec. 2014 - Dec. 2019. Owing to data availability, the analysis relies on a sub-sample of the whole population of S127 firms. This sub-sample features S127 firms whose total assets are at least equal to EUR 500 million. As of Dec. 2018, this sub-sample represents about 5% of the total number of S127 firms in Luxembourg, and about 85% of the total assets held by S127 firms in Luxembourg.

The static analysis shows that groups resorting to S127 entities perform various economic activities. Groups undertaking non-financial activities account for 80% of the total assets held by S127 entities and 70% of the total number of S127 entities. The remaining share relates to groups involved in financial activities. Across economic activities, the finance and insurance industry - and notably investment funds - holds the most important share of assets and number of entities in the sample of S127 firms. Groups headquartered in the US own the major share of S127 entities, whether in terms of total assets or number of entities. The remainder is mainly divided between European countries (notably the euro area), followed by East Asia and the rest of the world. The geographical breakdown of the balance sheet of S127 entities shows that their main counterparts are, on the whole, located in the euro area. The rest is mainly shared by European countries (excluding the euro area), followed by North America, East Asia and the rest of the world. Amongst individual countries, Luxembourg represents the most important balance sheet counterpart of S127 entities. This suggests that most MNEs own more than one S127 entity in Luxembourg. This implies that MNEs own a network of captive financial institutions - potentially of different types and of different sizes - to finance their business activities and structure their strategic corporate investments. The aggregated balance sheet of S127 entities mainly features equity and debt, both as direct investment. This suggests that S127 entities mainly favour capital shares (equity as direct investment) and intra-group loans (debt as direct investment) as financing means. The typology of S127 entities shows that the sample of S127 entities primarily features holding corporations, followed by intragroup lending companies, mixed structures, conduits and loan origination companies. The remaining types include captive factoring and invoicing corporations, companies with predominant non-financial assets, extra-group loan origination firms, wealth-holding entities and captive financial leasing corporations.

The dynamic analysis highlights that the total assets held by S127 entities increased over the period Dec. 2014 - June 2017 and decreased from July 2017 to Dec. 2019. The total number of S127 entities rose over the period Dec. 2014 - Nov. 2018 and declined between Dec. 2018 and Dec. 2019. The paper investigates the main contributors to these dynamics across various dimensions. Results show that the contribution of S127 entities differs in terms of magnitude and sign over time, depending on the main economic activity performed by the groups owning S127 entities, the nationality of the groups, the balance sheet counterpart of S127 entities, the balance sheet item and the type of S127 firm. In spite of these differences, several patterns emerge. Firstly, groups involved in specific activities contribute more than others to the evolution of total assets and number of S127 entities, whether during the expansion or decreasing phase. This is notably the case of groups performing the following activities: finance and insurance, pharmaceuticals, petrochemicals, electrical and medical equipment, food and beverages or transport equipment. The investment fund industry is singled out as it increases its total assets and number of S127 entities throughout the sample period. Secondly, the main contributors are groups headquartered in North America (notably the US and CA), followed by the euro area (notably DE, FR, NL, BE, LU, IE and IT) and specific European countries (in particular the UK, CH and SE). Third, equity as direct investment contributed in majority to the expansion phase of total assets and liabilities. Conversely, equity and debt, both as direct investment, contributed to the decreasing phase. Fourth, the analysis of the balance sheet counterpart of S127 entities points to Luxembourg as the most important contributor, followed by countries featuring a global financial centre (NL, BE, the US, the UK, BM, KY, *etc.*). Fifth, while holding companies appear as a major contributor during the expansion phase of total assets, intragroup lending corporations and mixed structures contributed to lower total assets. In addition, the two latter types of entities contributed substantially to lowering the number of S127 entities over the period Dec. 2018 - Dec. 2019. Finally, the paper addresses the new reporting and non-reporting motives driving the number of S127 entities. The main motive driving the expansion phase in the number of S127 entities before Dec. 2018 relates to entities created in the past and whose total assets increased above the EUR 500 million reporting threshold. The main motives driving the decrease in the number of S127 entities after Dec. 2018 pertain to S127 entities whose total assets fell below the EUR 500 million reporting threshold but that are still in operation, and to liquidations of S127 entities.

While providing insights into the sector S127 in Luxembourg, the paper does not address or test the determinants of MNE ownership structures, although alludes to them. Indeed, the sample does not permit a reflection on the full ownership structure of groups over time, as it focuses exclusively on resident S127 entities with total assets at least equal to EUR 500 million. Moreover, the dataset spans a relatively short period and data can be subject to revisions notably at the end of the period. Nevertheless, the insights provided by the paper on the sector S127 in Luxembourg can still be deemed as a necessary pre-requisite before modelling the determinants of the dynamics of total assets and number of S127 entities in Luxembourg. The latter topic may constitute a future research agenda.

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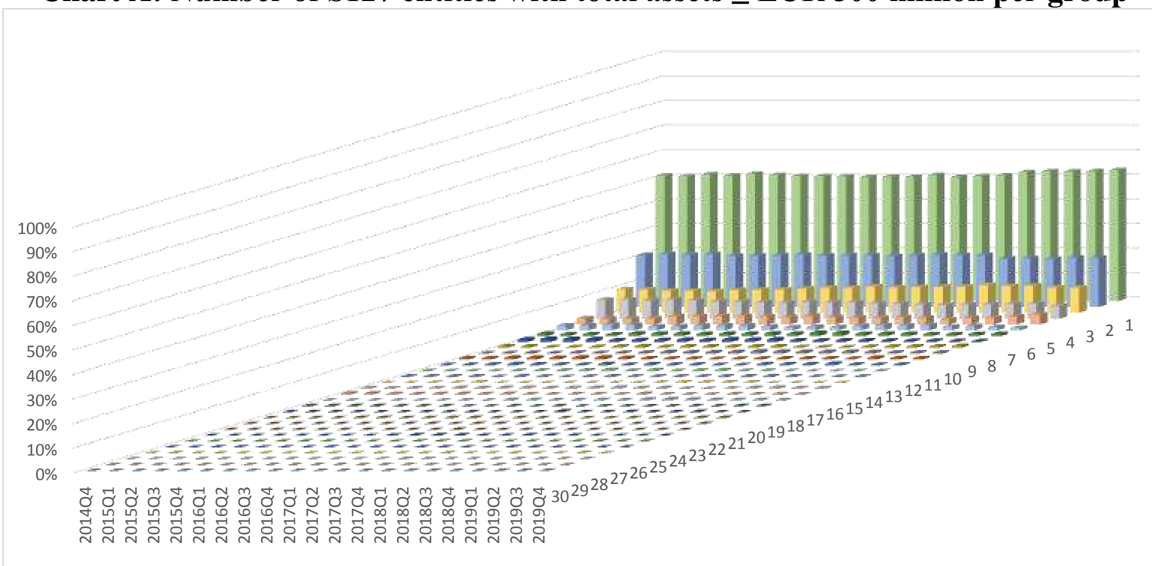
Appendix

A. Distribution of the number of S127 entities per group over time

Chart A presents the number of S127 entities per group. The entities under consideration are those with total assets at least equal to EUR 500 million.

Chart A: Number of S127 entities with total assets ≥ EUR 500 million per group



Source: BCL, authors' calculations. Units: Percent. Period: Q4 2014-Q4 2019

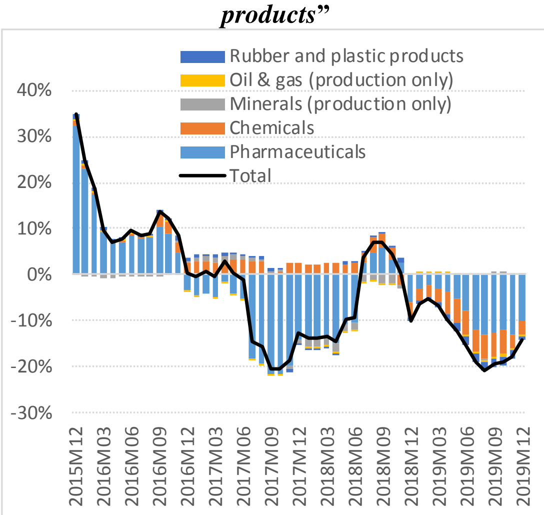
On average, over the period Q4 2014 - Q4 2019, 51% of the groups in the sample hold a unique S127 entity whose total assets are at least equal to EUR 500 million, 21% of the groups hold two S127 entities, 10% of the groups hold three S127 entities, 7% of the groups hold four S127 entities and 3% of the groups hold five S127 entities.

This does not necessarily mean that groups hold in majority one S127 entity but that they only favour a limited amount of structures owning large assets (*i.e.* entities with total assets greater than or equal to EUR 500 million). This result is even more likely as the analysis of the geographical counterpart of the balance sheet of S127 entities shows that the most important counterpart is Luxembourg (see section 4.3).

B. Contribution to the evolution of total assets held by S127 entities

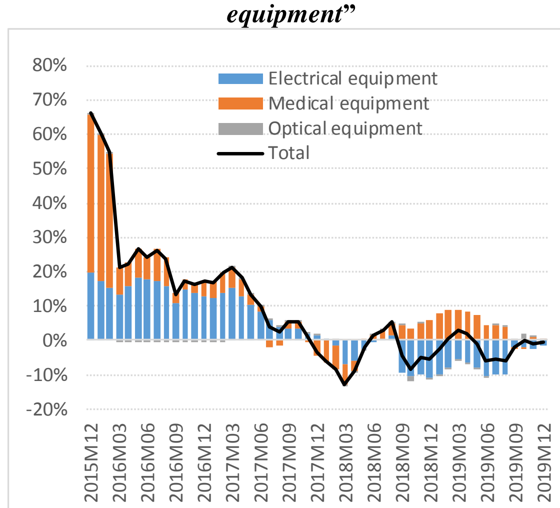
Charts B.1 to B.6 present the contribution to the year-on-year evolution of total assets held by S127 entities by main economic activity undertaken by their respective group: "*Chemicals and non-metallic mineral products*", "*Electrical, medical and optical equipment*", *Finance and insurance*", "*Food products, beverages and tobacco*", "*Information, telecommunications and computer services*" and "*Mining, drilling and quarrying*".

Chart B.1: "*Chemicals and non-metallic mineral products*"



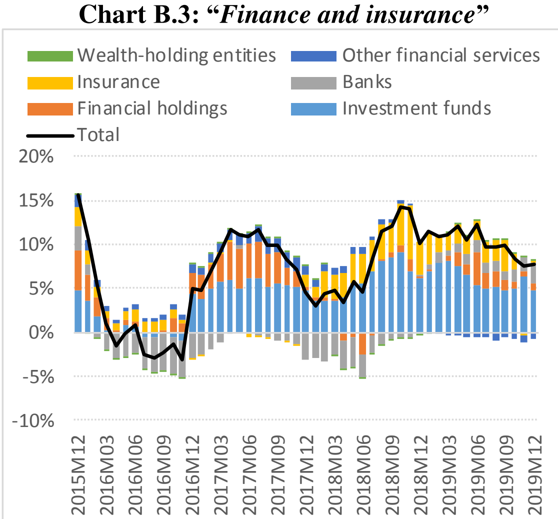
Source: BCL, authors' calculations. Unit: Percent

Chart B.2: "*Electrical, medical and optical equipment*"



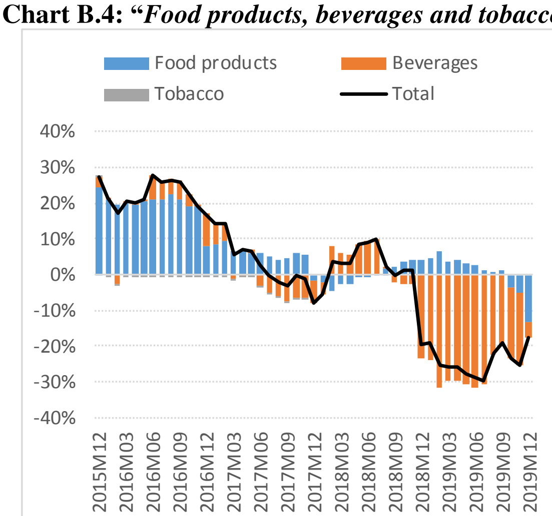
Source: BCL, authors' calculations. Unit: Percent

Chart B.3: "*Finance and insurance*"



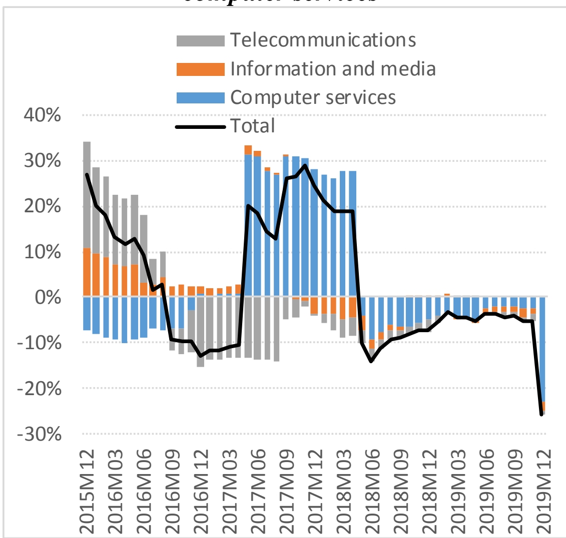
Source: BCL, authors' calculations. Unit: Percent

Chart B.4: "*Food products, beverages and tobacco*"



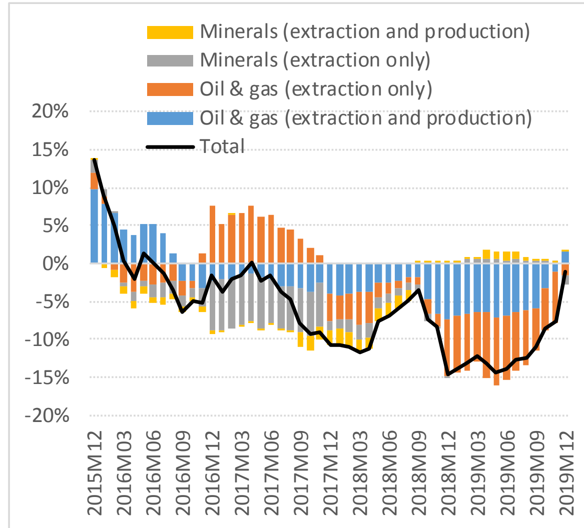
Source: BCL, authors' calculations. Unit: Percent

Chart B.5: “*Information, telecommunications and computer services*”



Source: BCL, authors’ calculations. Unit: Percent

Chart B.6: “*Mining, drilling and quarrying*”

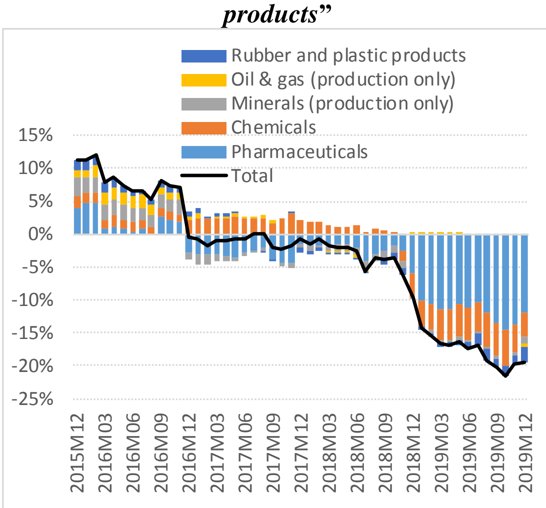


Source: BCL, authors’ calculations. Unit: Percent

C. Contribution to the evolution of the number of S127 entities

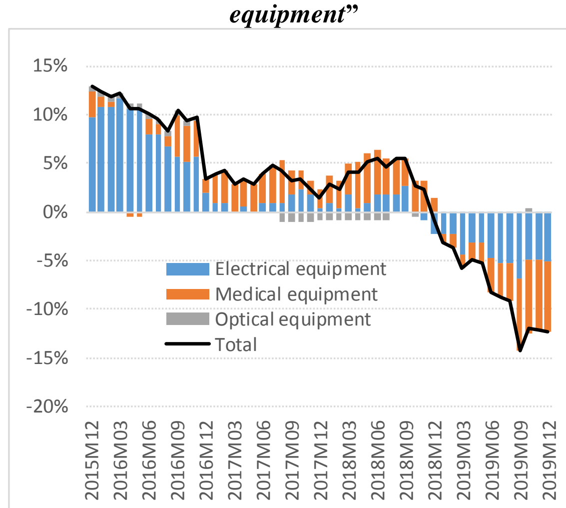
Charts C.1 to C.6 present the contribution to the year-on-year evolution of the total number of S127 entities by main economic activity undertaken by their respective group: “*Chemicals and non-metallic mineral products*”, “*Electrical, medical and optical equipment”*, *Finance and insurance*”, “*Food products, beverages and tobacco*”, “*Information, telecommunications and computer services*” and “*Mining, drilling and quarrying*”.

Chart C.1: “*Chemicals and non-metallic mineral products*”



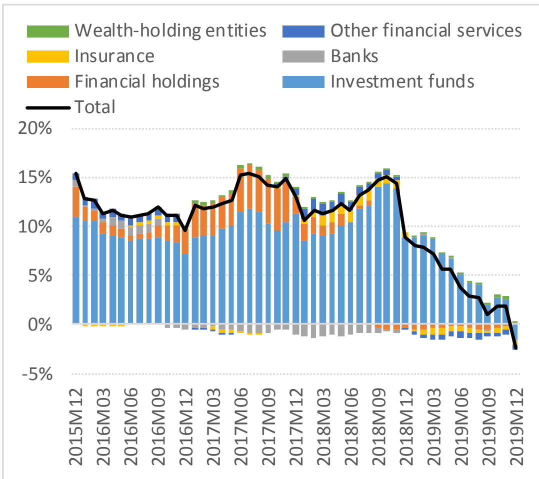
Source: BCL, authors’ calculations. Unit: Percent

Chart C.2: “*Electrical, medical and optical equipment*”



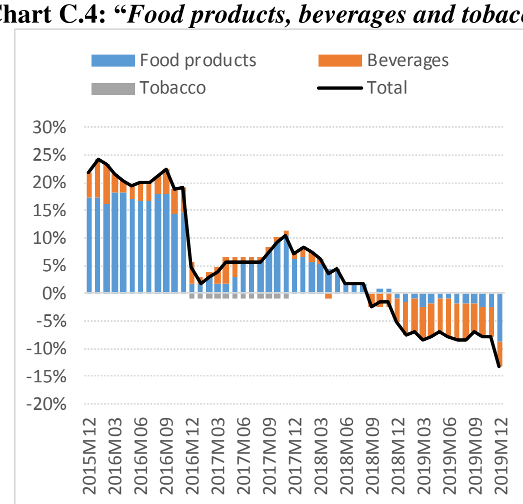
Source: BCL, authors’ calculations. Unit: Percent

Chart C.3: "*Finance and insurance*"



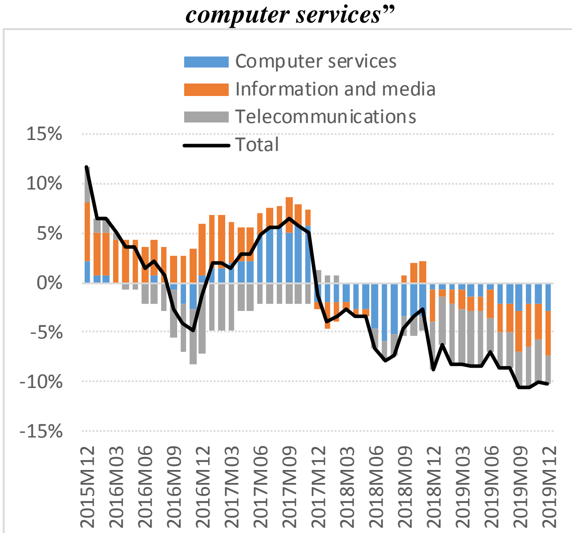
Source: BCL, authors' calculations. Unit: Percent

Chart C.4: "*Food products, beverages and tobacco*"



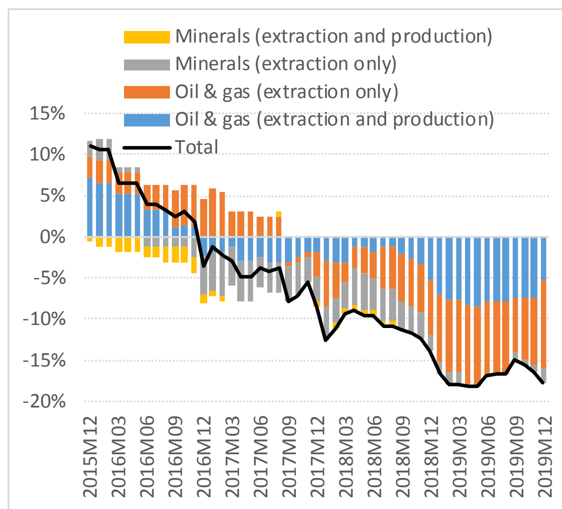
Source: BCL, authors' calculations. Unit: Percent

Chart C.5: "*Information, telecommunications and computer services*"



Source: BCL, authors' calculations. Unit: Percent

Chart C.6: "*Mining, drilling and quarrying*"



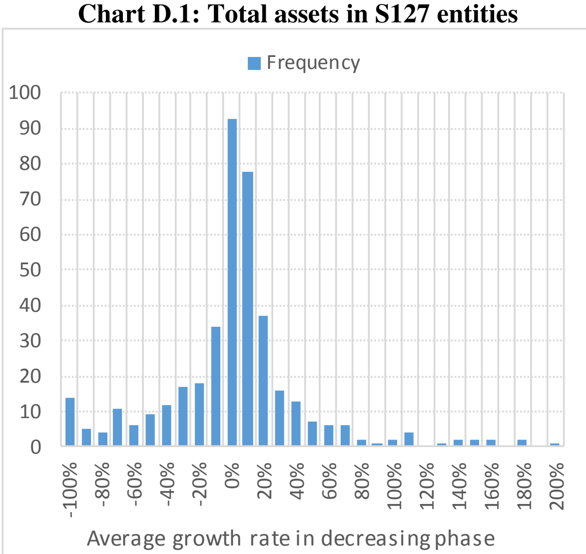
Source: BCL, authors' calculations. Unit: Percent

D. Evidence at the group (micro) level

Charts D.1 and D.2 present the distribution of the average year-on-year (YoY) growth rate of the total assets and total number of S127 entities owned by the groups headquartered in the United States over the decreasing phase (respectively, July 2017-Dec. 2019 for the total assets and Dec. 2018-Dec. 2019 for the total number of S127 entities). The charts show that, at the group level, during this decreasing phase, some US groups lowered their assets and total number of S127 entities in Luxembourg, while other US groups increased them or left them unchanged.

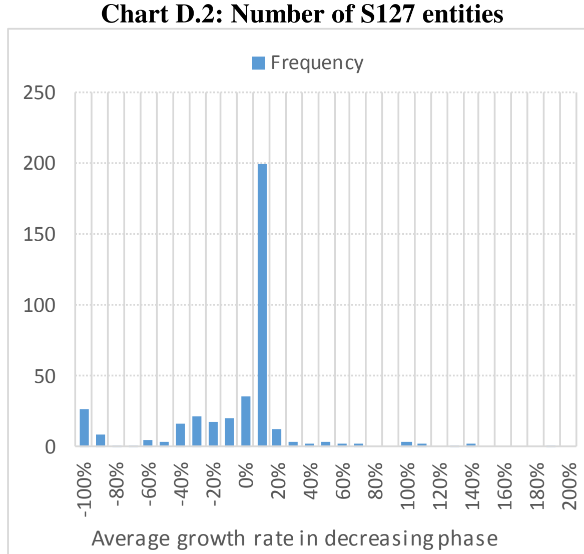
Chart D: Distribution of the YoY growth rate of total assets and number of S127 entities owned by the groups headquartered in the US, during the decreasing phase

Chart D.1: Total assets in S127 entities



Source: BCL, authors' calculations. Units: Number

Chart D.2: Number of S127 entities



Source: BCL, authors' calculations. Units: Number

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