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A TYPOLOGY OF CAPTIVE FINANCIAL INSTITUTIONS IN LUXEMBOURG: LESSONS FROM A NEW DATABASE

GABRIELE DI FILIPPO FRÉDÉRIC PIERRET

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A Typology of Captive Financial Institutions in Luxembourg: Lessons from a New Database

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Gabriele Di Filippo
Department of Statistics
Banque centrale du Luxembourg

Frédéric Pierret
Department of Statistics
Banque centrale du Luxembourg

Abstract

The paper draws a typology of captive financial institutions and money lenders (CFIs, sector S127) in Luxembourg from a new database. The latter retrieves information from three sources: the EuroGroups Register managed by Eurostat, the Statistical Business Register managed by the STATEC (National Institute for Statistics and Economic Studies) and the Central Balance Sheet Register managed by the STATEC. The new database enhances the data coverage of CFIs in Luxembourg. Indeed, it includes not only CFIs with total assets larger or equal to EUR 500 million as in the BCL reporting (BCL (2014)), but also CFIs whose total assets are lower than EUR 500 million. The period of analysis spans 2011 to 2019. Results show that CFIs present different characteristics depending on their balance sheet size. On the one hand, CFIs with total assets larger than EUR 100 million mainly regroup holding companies, intragroup lending corporations, mixed structures and conduits. On the other hand, CFIs with total assets lower than EUR 100 million feature mostly mixed structures. Overall, while holding corporations own the majority of total assets, the largest number of companies consists of mixed structures.

Keywords: Captive financial institutions and money lenders, Sector S127, Typology, EuroGroups Register, Statistical Business Register, Central Balance Sheet Register, Big Data

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 Octavia Domp-Sandu, Nelia Goncalves, Patricia Gonzalez, Ivete Gomes Ferreira, Allal Boussata, Paul Feuvrier, Kola Lendele, Germain Stammet and Romain Weber. We also thank Etienne Barthelemy for IT support. We are also grateful to Eurostat team in charge of the EuroGroups Register (EGR) - namely, Agne Bikauskaite, Alina-Maria Preda and Sergio Luis Macia Sanahuja - for their tutorials on the description and use of the EGR database. Any remaining errors are the sole responsibility of the authors.

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Non-Technical Summary

The paper draws a typology of captive financial institutions and money lenders (CFIs, sector S127) in Luxembourg from a new database. The latter retrieves information from three sources: the EuroGroups Register (EGR) managed by Eurostat, the Statistical Business Register managed by the STATEC (National Institute for Statistics and Economic Studies) and the Central Balance Sheet Register (CBSR) managed by the STATEC. The new database enhances the data coverage of CFIs in Luxembourg. Indeed, it includes not only CFIs with total assets larger or equal to EUR 500 million as in the BCL reporting (BCL (2014)), but also CFIs with total assets lower than EUR 500 million. In turn, this new database allows for a more comprehensive analysis of CFIs in Luxembourg compared to previous studies that used the BCL reporting (Di Filippo and Pierret (2020a, 2020b)). However, differences prevail between the new database and the BCL reporting. Indeed, the new database provides annual data over the period 2011-2019, while the BCL reporting features monthly data over the period December 2014-September 2021. Hence, the BCL reporting presents shorter delays concerning data updates. In addition, contrary to the BCL reporting, the new database does not include a breakdown of balance sheet items by geographical and sectoral counterpart, maturity and currency. In spite of these limits, the accounting information available in the new database allows implementing the methodology presented in Di Filippo and Pierret (2020a) to draw a typology of CFIs. In particular, the new database enables investigating whether small CFIs with total assets lower than EUR 500 million share similar features with large CFIs whose total assets are at least equal to EUR 500 million.

Results show that CFIs present different characteristics depending on their balance sheet size. On the one hand, CFIs with total assets larger than EUR 100 million mainly regroup holding companies, intragroup lending corporations, mixed structures and conduits. On the other hand, CFIs with total assets lower than EUR 100 million feature mostly mixed structures. Overall, while holding corporations own the majority of total assets, the largest number of CFIs consists of mixed structures.

Mixed structures bring together a mix of holding and intragroup lending corporations, companies declaring losses (negative capital) all over their living period and other mixed structures. The prototype balance sheets of mixed structures are distinct from the prototype balance sheets of the other types of CFIs.

A possible explanation relating to the use of mixed structures by multinational enterprises (MNEs) is that they reduce costs and increase organisational efficiency. Indeed, mixed structures concentrate on different types of activities within a single structure, instead of resorting to multiple entities that perform a specific activity.

Additional investigations show that even if the relative proportions of the various types of CFIs differ across various ranges of total assets, they remain stable over time within a given range of total assets. The analysis of switches by entities from one type to another corroborates the relative stability in the proportions of the various types of CFIs. Indeed, within a given range of total assets, the majority of CFIs features the same type over the sample period.

The evolution of the total number and total assets of CFIs shares similar characteristics across ranges of total assets and across types of CFIs. They trend upward from 2011 to 2015, and then slowdown or lower after 2015. However, the timing and magnitude of the trend reversal differ depending on the type of CFI. In retrospect, the relative importance of the upward trend over the period 2011-2015 can be explained by an increase in the use of CFIs by MNEs as well as by improvements in the data coverage brought to the EGR and CBSR databases from statistical offices.

Résumé Non Technique

L'article dresse une typologie des institutions financières captives et prêteurs non institutionnels (CFI, secteur S127) au Luxembourg à partir d'une nouvelle base de données. Cette dernière exploite les informations de trois sources : le Registre EuroGroups (EGR) géré par Eurostat, le Répertoire des entreprises géré par le STATEC (Institut luxembourgeois des statistiques nationales) et la Centrale des bilans (CBSR) gérée par le STATEC. La nouvelle base de données améliore le taux de couverture des données relatives aux CFI au Luxembourg. En effet, elle intègre non seulement les CFI dont le total des actifs est supérieur ou égal à 500 millions d'euros comme dans la base de données compilée actuellement par la Banque centrale du Luxembourg (BCL (2014)), mais également les CFI dont le total des actifs est inférieur à 500 millions d'euros. Ainsi, cette nouvelle base de données permet une analyse plus complète des CFI au Luxembourg par rapport aux études précédentes qui s'appuyaient sur la collecte BCL (Di Filippo et Pierret (2020a, 2020b)). Cependant, des différences prévalent entre la nouvelle base de données et la collecte BCL. En effet, la nouvelle base de données fournit des données annuelles sur la période 2011-2019, tandis que la collecte BCL présente des données mensuelles sur la période décembre 2014-septembre 2021. Le collecte BCL offre ainsi des délais plus courts concernant la mise à jour des données. De plus, contrairement à la collecte BCL, la nouvelle base de données ne comporte pas de ventilation des postes du bilan par contrepartie géographique, par maturité ou par devise. Malgré ces limites, les informations comptables disponibles dans la nouvelle base de données permettent d'implémenter la méthodologie présentée dans Di Filippo et Pierret (2020a) pour dresser une typologie des CFI. En particulier, la nouvelle base de données permet de déterminer si les CFI dont le total des actifs est inférieur à 500 millions d'euros partagent des caractéristiques similaires aux CFI dont le total des actifs est au moins égal à 500 millions d'euros.

Les résultats montrent que les CFI présentent des caractéristiques différentes selon la taille de leur bilan. D'une part, les types de CFI dont le total des actifs est supérieur à 100 millions d'euros concernent principalement les sociétés holding, les sociétés de prêt intragroupe, les structures mixtes et les conduits. D'autre part, les CFI dont le total des actifs est inférieur à 100 millions d'euros présentent en majorité des structures mixtes. Dans l'ensemble, alors que les

sociétés holding détiennent la majorité des actif totaux, les structures mixtes constituent le plus grand nombre de CFI.

Les structures mixtes regroupent un mélange de holdings et de sociétés de prêt intragroupe, des sociétés déclarant des pertes (et dont le capital est négatif) et d'autres structures mixtes. Les bilans comptables des structures mixtes sont distincts des bilans comptables des autres types de CFI.

Une explication possible liée à l'utilisation de structures mixtes par les entreprises multinationales est qu'elles permettent de réduire les coûts et d'augmenter l'efficience organisationnelle. En effet, les structures mixtes concentrent différents types d'activités au sein d'une même structure, au lieu de recourir à plusieurs entités exerçant une activité spécifique.

L'analyse montre également que même si les proportions des différents types de CFI varient en fonction de la taille des bilans, ces proportions restent stables dans le temps au sein d'un intervalle donné d'actif total. L'analyse du passage d'un type de CFI à un autre corrobore la relative stabilité des proportions des différents types de CFI. En effet, au sein d'une tranche d'actif total donnée, la majorité des CFI gardent le même type au cours de la période d'analyse.

L'évolution du nombre total et de l'actif total des CFI partage des caractéristiques similaires entre différentes tranches d'actifs total et entre différents types de CFI. Leur tendance augmente de 2011 à 2015, puis ralentit ou baisse après 2015. La période et l'amplitude de l'inversion de la tendance diffèrent toutefois selon le type de CFI. Rétrospectivement, l'importance relative de la tendance haussière sur la période 2011-2015 peut s'expliquer par une augmentation de l'utilisation des CFI par les entreprises multinationales et par des améliorations apportées aux bases de données EGR et CBSR concernant la couverture des données de la part des instituts de statistique.

1. Introduction

In Luxembourg, captive financial institutions and money lenders (CFIs) account for a substantial part of the stock of inward and outward foreign direct investment (FDI). As a result, analysing CFIs can help understanding the evolution of FDI at the country level. A potential way to investigate captive financial institutions and money lenders is to establish a typology of these entities.

A previous paper by Di Filippo and Pierret (2020a) exploited data from the BCL reporting to draw a typology of CFIs in Luxembourg. The BCL reporting gathers periodic balance sheet items data for CFIs resident in Luxembourg. However, only CFIs with total assets at least equal to EUR 500 million are subject to the periodic reporting obligations to the BCL (BCL (2014))[1]. The data collection is thus limited to a sub-sample of the whole population of CFIs. This sub-sample represents about 5% of the total number of resident CFIs, and about 90% of total assets held by resident CFIs. Due to the importance of CFIs in Luxembourg, whether in terms of number or activity (notably regarding periodic flows with the rest of the world), the current data coverage of CFIs in the BCL reporting suits current needs and represents a necessary and sufficient trade-off between costs and benefits.

In spite of these limitations, requests arise to better understand CFIs not covered in the BCL reporting, which represent 95% of the total number of resident CFIs, and about 10% of total assets held by resident CFIs. These requests stem from supranational bodies. In particular, the European Central Bank and Eurostat have recommended filling as much as possible the remaining coverage gap of CFIs at the national level. The additional data coverage requires the CFIs' balance sheet items as well as their breakdown by geographical counterpart, maturity and currency. These requests also relate to the relative importance played by CFIs in Luxembourg, as these companies are notable drivers of inward and outward stocks/flows of FDI. Indeed, the country acts as a global financial hub for multinational enterprises (MNEs) which resort to CFIs for managing their business activities and structuring their corporate investments.

[1] For more information, see Regulation of the Banque centrale du Luxembourg 2014/N°17 of 21 July 2014 concerning the collection of statistical data from financial companies amending the Regulation of the Banque centrale du Luxembourg 2011/N°8 of 29 April 2011 concerning the collection of statistics from companies which grant loans or issue debt securities or derivative instruments to affiliates. Available at: https://www.bcl.lu/en/Legal-Framework/documents_national/regulations/Annexes-2014_17/index.html#R%C3%A8glement%25202014/N%C2%B017%2520du%252021%2520juillet%25202014

A potential way to enhance the data coverage of the population of CFIs resident in Luxembourg is to look for alternative data sources.

Against this background, the paper draws a typology of captive financial institutions and money lenders (CFIs, sector S127) in Luxembourg from a new database. The latter retrieves information from three sources: the EuroGroups Register managed by Eurostat, the Statistical Business Register managed by the STATEC (National Institute for Statistics and Economic Studies) and the Central Balance Sheet Register managed by the STATEC. The new database enhances the data coverage of CFIs in Luxembourg. Indeed, it includes not only CFIs with total assets larger or equal to EUR 500 million as in the BCL reporting (BCL (2014)), but also CFIs with total assets lower than EUR 500 million. In other words, the new database covers a larger share of the population of resident CFIs and enables a more comprehensive analysis of CFIs in Luxembourg compared to previous studies that used the BCL reporting (Di Filippo and Pierret (2020a, 2020b)).

However, differences prevail between the new database and the BCL reporting. Indeed, the new database provides annual data over the period 2011-2019, while the BCL reporting features monthly data over the period December 2014-September 2021. Hence, the BCL reporting presents shorter delays concerning data updates. In addition, contrary to the BCL reporting, the new database does not include a breakdown of balance sheet items by geographical counterpart, maturity and currency. In spite of these limits, the accounting information available in the new database allows implementing the methodology presented in Di Filippo and Pierret (2020a) to draw a typology of CFIs. In particular, the new database enables investigating whether small CFIs with total assets lower than EUR 500 million share similar features with large CFIs whose total assets are at least equal to EUR 500 million.

The remainder of the paper is organised as follows. Section 2 presents the data sources used to build the new database of CFIs in Luxembourg. Section 3 describes the various steps to build the new database. Concretely, the selection of CFIs is based on vintage NACE codes from the EuroGroups Register and on current NACE codes from the Statistical Business Register. The accounting information necessary to build the prototype balance sheets of CFIs relies on data from the standardised chart of accounts available in the Central Balance Sheet Register. Section 4 defines the potential types of CFIs as well as the methodology used to identify the prototype balance sheets of CFIs. Section 5 presents the results by exposing the typology for CFIs as a whole

as well as across various ranges of total assets. The section also analyses the probability of switching from one type to another over time. Section 6 provides additional investigations at the type level. Section 7 concludes.

2. Data sources

2.1 The EuroGroups Register (EGR)

The EuroGroups Register (EGR)[2,3] is the statistical business register of multinational enterprise (MNE) groups operating within the European Union (EU) Member States and European Free Trade Association (EFTA) countries.

The creation of EGR answers two objectives. The first objective seeks to improve the consistency of national data on enterprise groups and propose a harmonised data framework across EU and EFTA countries. The second objective aims to better capture globalisation effects on enterprises, by gathering information about the evolution of MNEs' structures over time and across countries.

To this end, EGR delivers annual data on the structure of multinational groups operating in Europe, as at 31st December of each reference year. To create the EGR frames, Eurostat collects data on enterprise groups from the national statistical business registers of EU and EFTA countries. The national statistical institutes (NSIs) provide micro data on the constituent units of the groups and on their relationships[4]. In addition, Eurostat complements the information from national statistical registers with one commercial dataset. The latter ensures coverage for units outside the EU and EFTA, and full consistency of the largest enterprise groups. The EGR production process gives highest priority to data from the country of the subsidiaries (bottom-up view), followed by data from the country of the parent companies (top-down view), followed and complemented by data from the commercial data provider.

Once final information on legal units and relationships is gathered for a reference year, EGR compiles the enterprise group structures. The enterprise groups are built on legal units, which are linked together by control relationships, where the voting rights are above 50%.

[2] See https://ec.europa.eu/eurostat/web/structural-business-statistics/structural-business-statistics/eurogroups-register
[3] See also Bikauskaite *et al*. (2019).
[4] In Luxembourg, the STATEC performs this task. Eurostat is in charge of the centralization, compilation and management of the data.

In terms of data content, EGR regroups information on the legal units (identification, control and ownership characteristics), the enterprises (identification, main activity code (NACE), number of persons employed, turnover, institutional sector) and the enterprise groups (identification, group structure with relationships and control of enterprises within the groups and shareholdings of at least 10 percent, the group head, the country of global decision centre (country of the group), the main activity code (NACE), the consolidated employment and the turnover of the group).

Thanks to methodological enhancements in the compilation process, the quality of the data in EGR improved over time. In particular, EGR data for reference years 2008 to 2011 were processed based on the EGR 1.0. In the latter, data of large MNE groups were acquired from two commercial sources and then validated by NSIs. However, EGR 1.0 offers only a partial coverage of MNE groups. As a result, the EGR process was redesigned to EGR 2.0 from 2012 with full implementation from 2015 onwards, allowing a coverage of all relevant MNE groups present in the EU for reference years 2015 onwards. Moreover, while NSIs are responsible for the quality of the data, Eurostat implements quality checks based on alternative data sources such as the Global Legal Identifier Foundation database (GLEIF) [5] , the Analytical Database on Individual Multinationals and Affiliates (ADIMA)[6] database managed by the OECD or the EDGAR database managed by the US Securities and Exchange Commission[7].

The EGR database presents some limitations. The collection and validation of EGR data feature complex and long processes. In fact, EGR final data for the reference years are currently available 15 months after the end of each reference year. In addition, EGR covers very well the large and medium sized multinational groups (groups having 250 or more employed persons). However, small groups and their constituent enterprises are covered to a lower extent. Besides, EGR is a statistical register with restricted use as data are only accessible for statisticians producing

[5] See https://www.gleif.org/en/. The Global Legal Entity Identifier Foundation (GLEIF,) 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

[6] See https://www.oecd.org/sdd/its/measuring-multinational-enterprises.htm

[7] See https://www.sec.gov/edgar/searchedgar/companysearch.html

national statistics in the EU and EFTA NSIs and national central banks. Eventually, for each reference year, EGR data are frozen meaning that once published, the information contained in the datasets cannot be revised based on updated information. In other words, EGR only includes vintage data.

2.2 The Statistical Business Register (SBR)

The STATEC compiles a Statistical Business Register (*Répertoire des entreprises*, SBR). The latter provides information on the economic activities of resident companies and classifies them according to their main activity using the NACE code as a reference classification.

The NACE (Nomenclature of Economic Activities) code is the European statistical classification of economic activities. The NACE classifies companies according to their economic activities. Statistics produced on the basis of NACE codes are comparable at the European level and, in general, at the world level in line with the United Nations (2008)'s International Standard Industrial Classification (ISIC).

Apart from the code and the wording of the nomenclature, the Statistical Business Register also provides the names and addresses of resident companies. The STATEC updates the data on a monthly basis.

Note that the STATEC provides a public and a restricted version of the Statistical Business Register. As of January 2020, the public version covers 37807 companies (STATEC (2021a, 2021b)). This public version does not include all economic activities. Some are excluded due to incomplete information or their nature. This is particularly the case of the category falling under "Activities of holding companies" - hence CFIs - for which the public access is restricted. Nevertheless, the STATEC grants access to the BCL regarding the latter information. As a result, in order to build the sample of CFIs resident in Luxembourg, the paper utilises the current NACE code allocated by the STATEC to a given resident company in the restricted version of the Statistical Business Register.

2.3 The Central Balance Sheet Register (CBSR)

In 2010, the National Commission for Accounting Standards (*Commission des normes comptables du Luxembourg*, CNC) put forward a standardised chart of accounts (*plan comptable standardisé*) that applies to resident companies in Luxembourg from 1 January 2011. Since then,

companies that do have the legal obligation to file their annual accounts with the Luxembourg Business Register must deposit their annual accounts on an electronic platform for the collection of financial data (or *plateforme électronique de Collecte des Données Financières*, eCDF). The Luxembourg Business Register manages this platform. The latter aims to provide a central and neutral framework for the preparation, electronic validation and transmission of financial data. This collection is carried out using structured forms, which ensures a standardized collection of data and enables a suitable comparison and use of accounting data published by resident companies.

The national legislation defines the scope of deposit of the annual accounts mainly in relation to the size of the company (measured by the sales revenues), its legal form and the choice of its accounting regime (Gonzalez (2009), STATEC (2020)).[8]

The annual accounts deposited by resident companies on the electronic platform comprise the following documents: a balance sheet (*bilan comptable)*, a profit and loss account (*compte de résultats*) and a standardised chart of accounts (*plan comptable*). While companies can deposit a complete or an abridged version of the balance sheet and of the profit and loss account, a complete version of the standardised chart of accounts is mandatory.

The law of 10 July 2011 entitles the STATEC to compile and manage the accounting information of resident companies in a Central Balance Sheet Register (or *Centrale des bilans*, henceforward CBSR). This register retrieves information from the annual accounts deposited by resident companies on the electronic platform of the Luxembourg Business Register. The objectives of the CBSR is twofold. On the one hand, it centralizes the accounting information of resident companies in a standardised and harmonised electronic format. On the other hand, it publishes and disseminates this financial information in compliance with the conditions provided for by law.

For each resident company, the CBSR thus contains three main accounting documents: a balance sheet (*bilan comptable*), a profit and loss account (*compte de résultats*) and a standardised chart of accounts (*plan comptable*).

[8] Overall, the list of companies that must deposit their annual accounts in the CBSR cover resident companies, resident branches of foreign companies and sole proprietorships (with the exception of companies with less than EUR 100,000 in sales revenues). Resident companies that prepare their annual accounts according to international accounting standards are nevertheless exempt from this filing. For more information, see STATEC (2020).

From an accounting perspective, it is possible to compute the accounting items of the balance sheet based on items 1 to 5 of the standardised chart of accounts[9]. Items 6 and 7 of the standardised chart of accounts enable the calculation of the accounting items of the profit and loss account[10].

Although the CBSR compiles the annual accounts of almost all legal entities resident in Luxembourg, some companies may not publish their accounting documents on the electronic platform of the Luxembourg Business Register, in the specific format. This is generally the case when a company publishes its financial statements in a consolidated format at the group level or does not submit its annual accounts in accordance with the Luxembourg Generally Accepted Accounting Principles (Lux-GAAP). In this context, no data is available in the CBSR. However, STATEC (2020) highlights that for the reference year 2017, about 87% of resident companies had filed their annual accounts within 11 months of the end of the financial year. This suggests that the CBSR includes the accounting information of a major part of resident companies[11].

Though providing accounting data for a large majority of resident companies in Luxembourg, the CBSR features a limit that pertains to the delay of data availability. In fact, at the time of writing this paper, only the period 2011-2019 presents a sufficient coverage of accounting data for resident companies in the CBSR. This implies that the period of analysis considered in this paper limits to 2011-2019, in annual frequency.

3. Combining EGR, SBR and CBSR to build a new database of CFIs in Luxembourg

3.1 Selection of CFIs based on NACE codes from EGR and SBR

The paper aims to build a sample that represents the whole population of CFIs resident in Luxembourg over time. Following statistical standards, the selection of CFIs relies on the economic activities undertaken by a given company. The paper pinpoints CFIs which are resident

[9] The categories 1 to 5 of the standardised chart of accounts include the following items: Class 1: Equity, provisions and financial liabilities accounts (*Comptes de capitaux, de provisions, de dettes financières*); Class 2: Formation expenses and fixed assets accounts (*Comptes de frais d'établissement et d'actifs immobilisé*); Class 3: Inventories accounts (*Comptes de stocks*); Class 4: Debtors and creditors accounts (*Comptes de tiers*) and Class 5: Financial accounts (*Comptes financiers*).

[10] The categories 6 and 7 of the standardised chart of accounts include the following items: Class 6: Charges accounts (*Comptes de charges*) and Class 7: Income accounts (*Comptes de produits*).

[11] For more information concerning the CBSR, the reader can refer to the following website: https://statistiques.public.lu/fr/methodologie/methodes/entreprises/Centrale-bilans/centrale-bilans/index.html

companies and whose NACE codes fall under the categories [64.20, 64.305], in accordance with statistical standards.

The paper retrieves the NACE codes from the EuroGroups Register (EGR) and the Statistical Business Register (SBR). The STATEC is in charge of the allocation of these NACE codes. The STATEC provides four-digit NACE codes in EGR and five-digit NACE codes in the SBR. In addition, while EGR regroups vintage series of NACE codes, the SBR includes current series. EGR and the SBR are thus complementary sources for the NACE code to build a sample that represents the whole population of CFIs in Luxembourg over time. In particular, the consideration of vintage series in EGR addresses the issue of potential changes in economic activities (or equivalently, NACE codes) undertaken by a given company.

Altogether, the paper builds a sample of CFIs which are resident in Luxembourg[12] and whose current NACE code as allocated by the STATEC in the SBR falls under the categories [64.201, 64.202, 64.20X, 64.305] and whose vintage NACE code as allocated by the STATEC in EGR belongs to the broader category 64.20. Note that the selection of the NACE code 64.305 relies only on the current NACE code available in the SBR as it features five digits, contrary to the vintage NACE code 64.30 available in EGR, which features only four digits and hence does not enable to pinpoint the NACE code 64.305.

For a large majority of these entities (95%), the vintage NACE code in EGR matches with the current NACE code in the SBR. This suggests that the majority of CFIs carry out the same type of economic activities over time. Only a minority of CFIs (5%) available in EGR features a vintage NACE code different from the current NACE code. This minor difference can be explained by revisions in the NACE code associated to a given company due to statistical errors, borderline cases or changes in economic activities undertaken by a company over time.

The NACE code 64.20 includes entities performing "*Activities of holding companies*". The STATEC decomposes this type of activities into subcategories. The latter regroup the following

[12] As it focuses on CFIs which are resident in Luxembourg, the sample gathers entities whose Legal Units fall under the country code "LU" in EGR (hence, *LEU_COUNTRY_CODE*=LU).

items: "*1929 holdings*" (64.201), "*Sociétés de participation financière (or SOPARFIs)*" (64.202) and other activities undertaken by CFIs (64.20X).

Beyond the activities associated with NACE code 64.20, CFIs can also be used for the management of private wealth. In the latter case, they relate to the NACE code 64.305: "*Sociétés de gestion de patrimoine familial* (SPFs)". This sub-category belongs to the broader NACE category 64.30 that covers "*Trusts, funds and similar financial entities*". In this broader category and in accordance with statistical standards, the paper pinpoints CFIs with entities featuring a NACE code equal to 64.305. The other sub-categories mainly relate to investments funds and securitisation vehicles[13]. Since the STATEC provides only four-digit NACE codes in EGR, only the current five-digit NACE code available in the SBR allows disentangling the "*Sociétés de gestion de patrimoine familial* (SPFs)" from the other entities featuring a NACE code equal to 64.30.

3.2 Building CFIs' balance sheets based on the CBSR standardised chart of accounts

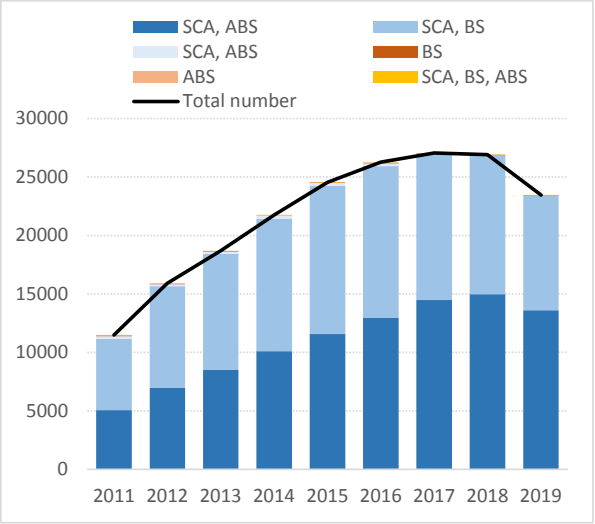
3.2.1 Accounting documents available in the CBSR

The paper identifies the different types of CFIs based on a prototype balance sheet associated to a given type of CFI. The building of these prototype balance sheets relies on the accounting information available in the CBSR. The latter regroups three types of documents that are of interest for us to retrieve financial information about a given company and build the prototype balance sheet. These documents are the standardised chart of accounts (*plan comptable*), the balance sheet (*bilan comptable*) or the abridged balance sheet (*bilan abrégé*).

[13] As a matter of fact, the STATEC decomposes the NACE 64.30 "*Fonds de placement et entités financières similaires*" (or Trusts, funds and similar financial entities) into the following sub-categories: 64.300 "*Fonds de placement et entités financières similaires*"; 64.301 "*Fonds communs de placement (FCP)*"; 64.302 "*Sociétés d'investissement à capital variable (SICAV)*"; 64.303 "*Sociétés d'investissement à capital fixe (SICAF)*"; 64.304 "*Sociétés d'investissement en capital à risque (SICAR)*"; 64.305 "*Sociétés de gestion de patrimoine familial (SPF)*"; 64.306 "*Organismes de titrisation*"; 64.307 "*Financement d'œuvres audiovisuelles*"; 64.309 "*Autres organismes de placement collectif n.c.a.*".

Chart 1 presents the evolution of the total number of CFIs over the period 2011-2019, along with the accounting documents available in the CBSR. In terms of coverage, the standardised chart of accounts (SCA) is available for more than 99% of selected CFIs based on the NACE code in the EuroGroups Register and the Statistical Business Register. The share of the balance sheet (BS) and that of the abridged balance sheet (ABS) cover only half of the CFIs available in the sample.

Chart 1: Accounting information available for CFIs in the CBSR (units: total number)



Source: Central Balance Sheet Register, STATEC

This observation is in line with the fact that companies can deposit a complete or an abridged version of the balance sheet on the electronic platform of the Luxembourg Business Register. Conversely, a complete version of the standardised chart of accounts is mandatory (see *infra*).

In addition, the standardised chart of accounts provides the largest level of granularity in terms of accounting information. This is not the case though for the balance sheet and even less so for its abridged version, given their relative high degree of aggregation concerning financial information. As a result, the paper favours the use of the standardised chart of accounts to build the prototype balance sheets of CFIs.

Note that for a small number of CFIs selected based on the NACE code, no accounting information is available in the standardised chart of accounts of the CBSR. Indeed, recall that financial information available in the CBSR is based on the financial statements deposited by resident companies on the electronic platform managed by the Luxembourg Business Register. These documents must respect a specific electronic format. Some companies may not publish their financial statements in this specific format. In this case, no data is available in the CBSR. This does not necessarily mean that these CFIs do not publish their annual accounts. Rather, this suggests that these CFIs do not publish their annual accounts in the required specific electronic

format. Generally, these CFIs release their accounting documents as consolidated accounts at the group level or do not submit their financial statements in accordance with the Luxembourg Generally Accepted Accounting Principles (Lux-GAAP).

Altogether, the NACE code and the condition on the existence of accounting data in the standardised chart of accounts available in the CBSR allows defining the sample of CFIs Ω^{CFIs} analysed in this paper. Hence:

$$\Omega^{\text{CFIs}} \Leftrightarrow \begin{cases} CFI_{i,t}^{BR,NACE} \in [64.201, 64.202, 64.20X, 64.305] \quad \cup \quad CFI_{i,t}^{EGR,NACE} = 64.20 \\ Total\ Assets_{i,t}^{CFI,CBSR} \neq \emptyset \end{cases} \quad (1)$$

3.2.2 Matching of accounting information: from standardised chart of accounts to prototype balance sheets

Since the paper considers the standardised chart of accounts as the most suitable accounting document to build the prototype balance sheet of CFIs, this section presents the necessary steps to match the items of the standardised chart of accounts with the items of the prototype balance sheet.

Step 1: Matching the standardised chart of accounts items with the CBSR balance sheet items

The standardised chart of accounts features seven classes. Five classes (Classes 1 to 5) pertain to the balance sheet items and two classes (Classes 6 and 7) relate to the profit and loss accounts. The various classes are listed below:

- Class 1: Equity, provisions and financial liabilities accounts (*Comptes de capitaux, de provisions, de dettes financières*);
- Class 2: Formation expenses and fixed assets accounts (*Comptes de frais d'établissement et d'actifs immobilisé*);
- Class 3: Inventories accounts (*Comptes de stocks*);
- Class 4: Debtors and creditors accounts (*Comptes de tiers*);
- Class 5: Financial accounts (*Comptes financiers*);
- Class 6: Charges accounts (*Comptes de charges*);
- Class 7: Income accounts (*Comptes de produits*).

Class 1 accounts generally belong to the liabilities and are in principle creditors. Class 2 and 3 accounts belong to the assets and are in principle debtors. Class 4 and 5 accounts are considered as assets if they are debtors and as liabilities if they are creditors. Class 6 and 7 corresponds respectively to a corporation's expenses and income as reported in the profit and loss account. If income is larger than (respectively, lower than) expenses, then the company generates a profit (respectively, a loss).

While Class 6 and 7 accounts enable to reproduce the profit and loss account of a company, Class 1 to 5 accounts allow replicating the balance sheet of a company. Table 1 presents the matching of accounting items between the standardised chart of accounts and the balance sheet of a company (labelled as CBSR balance sheet). This matching follows the guidelines of the National Commission for Accounting Standards (*Commission des normes comptables du Luxembourg*, CNC)[14].

[14] For more information, see https://www.cnc.lu/publications/plan-comptable-collecte/

Table 1: Matching between the standardised chart of accounts items and the CBSR balance sheet items

Assets		Liabilities	
Balance Sheet items	**Chart of Accounts**	**Balance Sheet items**	**Chart of Accounts**
A. Subscribed capital unpaid	Class 1 (items 102 to 103)	**O. Translation adjustments on the result for the financial year**	Class 1 (item 149)
A.I Subscribed capital not called	Class 1 (item 102)		
A.II Subscribed capital called but not paid	Class 1 (item 103)		
B. Formation expenses	Class 2 (item 20)	**A. Capital and reserves**	Class 1 (items 10 to 17)
C. Fixed assets	Class 2 (items 21 to 23)	A.I Subscribed capital	Class 1 (items 101, 104, 105, 106)
C.I Intangible assets	Class 2 (item 21)	A.II Share premium and similar premiums	Class 1 (item 11)
C.II Tangible assets	Class 2 (item 22)	A.III Revaluation reserves	Class 1 (item 12)
C.III Financial assets	Class 2 (item 23)	A.IV Reserves	Class 1 (item 13)
C.III.1 Shares in affiliated undertakings	Class 2 (item 231)	A.V Profit or loss brought forward	Class 1 (item 141)
C.III.2 Loans to affiliated undertakings	Class 2 (item 232)	A.VI Result for the financial year	Class 1 (item 142)
C.III.3 Shares in undertakings with which the company is linked by virtue of participating interests	Class 2 (item 233)	A.VII Interim dividends	Class 1 (item 15)
C.III.4 Loans to undertakings with which the company is linked by virtue of participating interests	Class 2 (item 234)	A.VIII Investment subsidies	Class 1 (item 16)
C.III.5 Investments held as fixed assets	Class 2 (item 235)	A.IX Immunised appreciation	Class 1 (item 17)
C.III.6 Loans and claims held as fixed assets	Class 2 (item 236)	**B. Subordinated creditors**	Class 1 (item 191)
C.III.7 Own shares or own corporate units	Class 2 (item 237)		
D. Current assets		**C. Provisions**	Class 1 (item 18)
D.I Stocks	Class 3 (items 30 to 34)	C.1 Provisions for pensions and similar obligations	Class 1 (item 181)
D.I.1 Raw materials and consumables	Class 3 (item 30)	C.2 Provisions for taxation	Class 1 (items 182, 183)
D.I.2 Work and contracts in progress	Class 3 (item 31)	C.3 Other provisions	Class 1 (item 188)
D.I.3 Finished goods and goods for resale	Class 3 (item 32,33)	**D. Non subordinated debts**	Class 1 and 4 (items 19, 43 to 47)
D.I.4 Payments on account	Class 3 (item 34)	D.1 Debenture loans	Class 1 (items 192 and 193)
D.II Debtors	Class 4 (items 40 to 44)	D.1.a Convertible loans	Class 1 (items 192)
D.II.1 Trade debtors	Class 4 (items 40 and 44)	D.1.b Non-convertible loans	Class 1 (items 193)
D.II.2 Amounts owed by affiliated undertakings	Class 4 (item 411)	D.2 Amounts owed to credit institutions	Class 1 (items 194)
D.II.3 Amounts owed by undertakings with which the company is linked by virtue of participating interests	Class 4 (item 412)	D.3 Payments received on account of orders in so far as they are not shown separately as deductions from stocks	Class 4 (item 43)
D.II.4 Other debtors	Class 4 (item 42)	D.4 Trade creditors	Class 4 (items 4015, 4025, 441)
D.III Investments		D.5 Bills of exchange payable	Class 4 (item 442)
D.III.1 Shares in affiliated undertakings and in undertakings with which the undertaking is linked by of participating interests	Class 5 (item 501, 502)	D.6 Amounts owed to affiliated undertakings	Class 4 (item 451)
D.III.2 Own shares or own corporate units	Class 5 (item 503)	D.7 Amounts owed to undertakings with which the company is linked by virtue of participating interests	Class 4 (item 452)
D.III.3 Other transferable securities and other financial instruments	Class 5 (item 508)	D.8 Tax and social security	Class 4 (item 46)
D.IV Cash at bank and in hand	Class 5 (item 51)	D.9 Other creditors	Class 4 (item 47, 195, 198)
E. Prepayments	Class 4 (items 484, 484, 486)	**E. Deferred income**	Class 4 (items 482, 483, 485, 487)
Total assets		**Total liabilities**	

Step 2: Matching the CBSR balance sheet items with the BCL balance sheet items

Once the paper performed the matching between the standardised chart of accounts and the CBSR balance sheet, it proceeds with the association of each item between the CBSR balance sheet and the BCL balance sheet. Indeed, the BCL reporting gathers balance sheet items data for CFIs according to a pre-determined structure of the balance sheet. Table 2 lists the balance sheet items available in the BCL reporting (BCL (2014)).

Table 2: BCL balance sheet items

Item	Definition	Item	Definition
1-LA2001	Intragroup loans: loans to shareholders	2-LA2001	Intragroup loans: loans from shareholders
1-LA2002	Intragroup loans: loans to companies where the company holds at least 10% of the social capital	2-LA2002	Intragroup loans: loans from companies where the company holds at least 10% of the social capital
1-LA2003	Intragroup loans: loans to sister companies	2-LA2003	Intragroup loans: loans from sister companies
1-N02000	Extra-group loans	2-N02000	Extra-group loans
1-003000	Debt securities	2-003000	Debt securities
1-005000	Equity securities	2-C05000	Capital
1-006000	Non-financial assets	2-002050	Short sales
1-007000	Financial derivatives	2-011000	Financial derivatives
1-090000	Other assets	2-090000	Other liabilities
1-000000	TOTAL Assets	2-000000	TOTAL Liabilities

Source: BCL (2014)

The assets side regroups financial assets, non-financial assets and other assets. Financial assets include intragroup loans granted to entities belonging to the same group of the CFI (1-LA2001, 1-LA2002, 1-LA2003) or extra-group loans provided to entities external to the group (1-N02000). Financial assets also cover the purchase of debt securities (1-003000) and equity securities (1-005000). The remaining items include non-financial assets (1-006000), financial derivatives (1-007000) and other assets (1-090000). As the latter item includes currency and deposits, it is assumed to proxy the item “currency and deposits” in the prototype balance sheet. The item “total assets” (1-000000) sums the total assets of the balance sheet.

The liabilities side covers financial liabilities, capital and other liabilities. Financial liabilities include intragroup loans granted to firms belonging to the same group of the CFI (2-LA2001, 2-LA2002, 2-LA2003) or extra-group loans provided to entities external to the group (2-N02000). Financial liabilities also regroup the issuance of debt securities (2-003000) and short sales (2-002050). The remaining items include capital (2-C05000), financial derivatives (2-011000) and other liabilities (2-090000). The item "total liabilities" (2-000000) sums the total liabilities of the balance sheet.

Table 3 presents the matching of accounting items between the CBSR balance sheet and the BCL balance sheet.

Table 3: Matching between the CBSR balance sheet items and the BCL balance sheet items

Assets		Liabilities	
CBSR Balance sheet items	**BCL balance sheet items**	**CBSR Balance sheet items**	**BCL balance sheet items**
A. Subscribed capital unpaid	1-LA2001	**O. Translation adjustments on the result for the financial year**	2-C05000
A.I Subscribed capital not called	1-LA2001		
A.II Subscribed capital called but not paid	1-LA2001		
B. Formation expenses	1-090000	**A. Capital and reserves**	2-C05000
C. Fixed assets		A.I Subscribed capital	2-C05000
C.I Intangible assets	1-006000	A.II Share premium and similar premiums	2-C05000
C.II Tangible assets	1-006000	A.III Revaluation reserves	2-C05000
C.III Financial assets		A.IV Reserves	2-C05000
C.III.1 Shares in affiliated undertakings	1-005000	A.V Profit or loss brought forward	2-C05000
C.III.2 Loans to affiliated undertakings	1-LA200X	A.VI Result for the financial year	2-C05000
C.III.3 Shares in undertakings with which the company is linked by virtue of participating interests	1-005000	A.VII Interim dividends	2-C05000
C.III.4 Loans to undertakings with which the company is linked by virtue of participating interests	1-LA200X	A.VIII Investment subsidies	2-C05000
C.III.5 Investments held as fixed assets	1-005000 or 1-003000	A.IX Immunised appreciation	2-C05000
C.III.6 Loans and claims held as fixed assets	1-LA200X	**B. Subordinated debts**	2-003000
C.III.7 Own shares or own corporate units	1-005000		
D. Current assets		**C. Provisions**	2-090000
D.I Stocks		C.1 Provisions for pensions and similar obligations	2-090000
D.I.1 Raw materials and consumables	1-006000	C.2 Provisions for taxation	2-090000
D.I.2 Work and contracts in progress	1-006000	C.3 Other provisions	2-090000
D.I.3 Finished goods and goods for resale	1-006000	**D. Non subordinated debts**	
D.I.4 Payments on account	1-N02000	D.1 Debenture loans	2-003000
D.II Debtors		D.1.a Convertible loans	2-003000
D.II.1 Trade debtors	1-N02000	D.1.b Non-convertible loans	2-003000
D.II.2 Amounts owed by affiliated undertakings	1-LA200X	D.2 Amounts owed to credit institutions	2-N02000
D.II.3 Amounts owed by undertakings with which the company is linked by virtue of participating interests	1-LA200X	D.3 Payments received on account of orders in so far as they are not shown separately as deductions from stocks	2-N02000
D.II.4 Other debtors	1-N02000 or 1-007000	D.4 Trade creditors	2-N02000
D.III Investments		D.5 Bills of exchange payable	2-N02000
D.III.1 Shares in affiliated undertakings and in undertakings with which the undertaking is linked by of participating interests	1-005000	D.6 Amounts owed to affiliated undertakings	2-LA200X
D.III.2 Own shares or own corporate units	1-005000	D.7 Amounts owed to undertakings with which the company is linked by virtue of participating interests	2-LA200X
D.III.3 Other transferable securities and other financial instruments	1-005000 or 1-003000	D.8 Tax and social security	2-090000
D.IV Cash at bank and in hand	1-N02000	D.9 Other creditors	2-090000 or 2-011000 or 2-N02000
E. Prepayments	1-090000	**E. Deferred income**	2-090000
Total assets	1-000000	**Total liabilities**	2-000000

Step 3: Matching the BCL balance sheet items with the prototype balance sheets

Table 4 presents the structure of the prototype balance sheet. The latter draws from IMF (2018) and Di Filippo and Pierret (2020a). The prototype balance sheet considers various items.

The assets side includes non-financial assets (NFA), equity and debt as direct investment (E_DI_A and D_DI_A, respectively) or as portfolio investment (E_PI_A and D_PI_A, respectively), loans as other investments (L_OI_A), currency and deposits (CD_OI_A) and financial derivatives (Deriv_A).

The liabilities side covers equity and debt as direct investment (E_DI_L and D_DI_L, respectively) or as portfolio investment (E_PI_L and D_PI_L, respectively), loans as other investments (L_OI_L), financial derivatives (Deriv_L), short sales (SS_L) and other liabilities (Other_L).

Table 4: Structure of the prototype balance sheet

Items		Assets (A)	Liabilities (L)
Non-Financial Assets		NFA	
Direct investment	**Equity**	E_DI_A	E_DI_L
	Debt	D_DI_A	D_DI_L
Portfolio investment	**Equity**	E_PI_A	E_PI_L
	Debt	D_PI_A	D_PI_L
Other investment	**Loans**	L_OI_A	L_OI_L
	Currency & Deposits	CD_OI_A	
Financial derivatives		Deriv_A	Deriv_L
Short sales			SS_L
Other liabilities			Other_L

Source: Di Filippo and Pierret (2020a), adapted from IMF (2018)

Tables 5.1 to 6.2 present the matching of accounting items between the prototype balance sheets, the BCL balance sheet, the CBSR balance sheet and the standardised chart of accounts.

On the assets side (Tables 5.1 and 5.2), non-financial assets (NFA) in the prototype balance sheets correspond with the item “non-financial assets” (1-006000) from the BCL balance sheet. To compute equity as direct investment (E_DI_A) and equity as portfolio investment (E_PI_A), the paper relies on the item “equity securities” (1-005000) from the BCL balance sheet. The distinction between equity as direct investment and equity as portfolio investment is based on the label of the accounting items available in the standardised chart of accounts as the latter benefits from a higher level of granularity concerning financial information. To calculate debt as direct investment (D_DI_A) and debt as portfolio investment (D_PI_A), the paper uses intragroup loans

(1-LA2001+1-LA2002+1-LA2003) and debt securities (1-003000) from the BCL balance sheet. Loans (L_OI_L) are tallied with extra-group loans (1-N02000) while currency and deposits (CD_OI_A) concur with other investments (1-090000). The paper also considers financial derivatives (Deriv_A), matching the BCL balance sheet item 1-007000.

On the liabilities side (Tables 6.1 and 6.2), to compute equity as direct investment (E_DI_L) and equity as portfolio investment (E_PI_L), the paper utilises the item "capital" (2-C05000) from the BCL balance sheet. The distinction between equity as direct investment and equity as portfolio investment relies on the label of the accounting items available in the standardised chart of accounts. To calculate debt as direct investment (D_DI_L) and debt as portfolio investment (D_PI_L), the paper uses intragroup loans (2-LA2001+2-LA2002+2-LA2003) and debt securities (2-003000) from the BCL balance sheet. Loans (L_OI_L) correspond to extra-group loans (2-N02000) from the BCL balance sheet. The paper also considers short sales (SS_L, proxied by the item 2-002050), financial derivatives (Deriv_L, proxied by the item 2-011000) and other liabilities (Other_L, proxied by the item 2-090000) in the prototype balance sheet of CFIs.

Table 5.1: Matching between prototype balance sheets, BCL balance sheet items, CBSR balance sheet items and standardised chart of accounts: assets-side

Prototype balance sheet			BCL balance sheet items	CBSR balance sheet items	Standardised chart of accounts items (Class)
Direct investment	**Equity**	***E_DI_A***	1-005000 within the group	C.III.1 Shares in affiliated undertakings	Shares in affiliated undertakings (231)
				C.III.3 Shares in undertakings with which the company is linked by virtue of participating interests	Shares in undertakings with which the company is linked by virtue of participating interests (233)
				C.III.7 Own shares or own corporate units	Own shares or own corporate units (237)
				D.III.1 Shares in affiliated undertakings and in undertakings with which the undertaking is linked by of participating interests	Shares in affiliated undertakings (501)
					Shares in undertakings linked by virtue of participating interests (502)
				D.III.2 Own shares or own corporate units	Own shares or own corporate units (503)
	Debt	***D_DI_A***	1-LA2001+1-LA2002 +1-LA2003+(1-003000 within the group)	A.I Subscribed capital not called (*Capital souscrit non appelé*)	Subscribed capital not called (Capital enterprises) (102)
				A.II Subscribed capital called but unpaid (*Capital souscrit appelé et non versé*)	Subscribed capital called but unpaid (Capital enterprises) (103)
				C.III.2 Loans to affiliated undertakings	Amounts owed by affiliated undertakings (232)
				C.III.4 Loans to undertakings with which the company is linked by virtue of participating interests	Amounts owed by undertakings with which the company is linked by virtue of participating interests (234)
				C.III.6 Loans and claims held as fixed assets	Loans and claims held as fixed assets (236)
				D.II.2 Amounts owed by affiliated undertakings	Amounts owed by affiliated undertakings (411)
				D.II.3 Amounts owed by undertakings with which the company is linked by virtue of participating interests	Amounts owed by undertakings with which the company is linked by virtue of participating interests (412)
Portfolio investment	**Equity**	***E_PI_A***	1-005000 outside the group	C.III.5 Investments held as fixed assets	Securities held as fixed assets (equity right) (2351)
				D.III.3 Other transferable securities and other financial instruments	Other transferable securities (5081, 5082, 5088)
	Debt	***D_PI_A***	1-003000 outside the group	C.III.5 Investments held as fixed assets	Securities held as fixed assets (creditor's right) (2352)
				D.III.3 Other transferable securities and other financial instruments	Debenture loans and notes issued and repurchased by the company (5083, 5084, 5085)

Table 5.2: Matching between prototype balance sheets, BCL balance sheet items, CBSR balance sheet items and standardised chart of accounts: assets-side

Prototype balance sheet			BCL balance sheet items	CBSR balance sheet items	Standardised chart of accounts items (Class)
Non-Financial Assets		**NFA**	1-006000	**C. Fixed assets**	
				C.I Intangible assets	Intangible fixed assets (21)
				C.II Tangible assets	Tangible fixed assets (22)
				D. Current assets	
				D.I Stocks	
				D.I.1 Raw materials and consumables	Raw materials and consumables (30)
				D.I.2 Work and contracts in progress	Work and contracts in progress (31)
				D.I.3 Finished goods and goods for resale	Finished goods and merchandise (32)
					Land and buildings held for resale (33)
Other investment	**Loans**	**L_OI_A**	1-N02000	D.I.4 Payments on account	Payments on account (34)
				D.II.1 Trade debtors	Customers (4011,4021)
					Customers - Receivable bills of exchange (4012,4022)
					Doubtful or disputed customers (4013,4023)
					Customers - Unbilled sales (4014,4024)
					Value adjustments (4019,4029)
					Suppliers with a debit balance (44113, 44123)
				D.II.4 Other debtors	Other receivables (42)
				D.IV Cash at bank and in hand	Cash at bank, in postal cheques accounts, cheques and in hand (51)
	Currency & Deposits	**CD_OI_A**	1-090000	**B. Formation expenses**	Formation expenses and similar expenses (20)
				E. Prepayments	Deferred charges (481)
					Transitory or suspense accounts – Assets (484)
					Linking accounts – Assets (486)
Financial derivatives		**Deriv_A**	1-007000	D.II.4 Other debtors	Financial derivative instruments (42187)
					Financial derivative instruments (42287)

Table 6.1: Matching between prototype balance sheets, BCL balance sheet items, CBSR balance sheet items and standardised chart of accounts: liabilities-side

Prototype balance sheet			BCL balance sheet items	CBSR balance sheet items	Standardised chart of accounts items (Class)
Direct investment	**Equity**	**E_DI_L**	2-C05000 within the group	**O. Translation adjustments on the result for the financial year**	Translation adjustments on the result for the financial year (149)
				A. Capital and reserves	
				A.I Subscribed capital	Subscribed capital (Capital enterprises - Total amount) (101)
					Capital of companies represented by individual business persons and of corporate partnerships (104)
					Endowment of branches (105)
					Accounts of the owner or the co-owners (individual business persons) (106)
				A.II Share premium and similar premiums	Share premium and similar premiums (11)
				A.III Revaluation reserves	Revaluation reserves (12)
				A.IV Reserves	Reserves (13)
				A.V Profit or loss brought forward	Results brought forward (141)
				A.VI Result for the financial year	Result for the financial year (142)
				A.VII Interim dividends	Interim dividends (15)
				A.VIII Investment subsidies	Capital investment subsidies (16)
				A.IX Immunised appreciation	Temporarily not taxable capital gains (17)
	Debt	**D_DI_L**	2-LA2001+2-LA2002+ 2-LA2003 +(2-003000 within the group)	D.6 Amounts owed to affiliated undertakings	Amounts payable to affiliated undertakings (451)
				D.7 Amounts owed to undertakings with which the company is linked by virtue of participating interests	Amounts payable to undertakings linked by virtue of participating interests (452)
Portfolio investment	**Equity**	**E_PI_L**	2-C05000 outside the group		
	Debt	**D_PI_L**	2-003000 outside the group	**B. Subordinated debts**	Subordinated debts (191)
				D.1.a Non subordinated debts - Debenture loans - Convertible loans	Convertible debenture loans (192)
				D.1.b Non subordinated debts - Debenture loans - Non convertible loans	Non-convertible debenture loans (193)

Table 6.2: Matching between prototype balance sheets, BCL balance sheet items, CBSR balance sheet items and standardised chart of accounts: liabilities-side

Prototype balance sheet			BCL balance sheet items	CBSR balance sheet items	Standardised chart of accounts items (Class)
Other investment	**Loans**	**L_OI_L**	2-N02000	D.2 Amounts owed to credit institutions	Amounts owed to credit institutions (194)
				D.3 Payments received on account of orders in so far as they are not shown separately as deductions from stocks	Payments received on account of orders as far as they are not deducted distinctly from inventories (43)
				D.4 Trade creditors	Customers with creditor balance (4015,4025)
					Trade payables (44111,44112,44121,44122)
				D.5 Bills of exchange payable	Bills of exchange payable (442)
				D.9 Other creditors	Financial lease payables (195)
					Other loans and similar debts (198)
Financial derivatives		**Deriv_L**	2-011000	D.9 Other creditors	Financial derivative instruments (4717)
					Financial derivative instruments (4728)
Short sales		**SS_L**	2-002050		
Other liabilities		**Other_L**	2-090000	C.1 Provisions for pensions and similar obligations	Provisions for pensions and similar obligations (181)
				C.2 Provisions for taxation	Provisions for taxation (182)
					Deferred tax provisions (183)
				C.3 Other provisions	Other provisions (188)
				D.8 Tax and social security	Tax and social security debts (46)
				D.9 Other creditors	Other debts (47)
				E. Deferred income	Deferred income (482)
					State - Emission rights received (483)
					Transitory or suspense accounts – Liabilities (485)
					Linking accounts – Liabilities (487)

4. Prototype balance sheet of CFIs and methodology: a reminder

4.1 Potential types of CFIs: a reminder

This section presents the potential types of CFIs listed in Di Filippo and Pierret (2020a) along with the structure of their prototype balance sheets. The section benefits from the work of IMF (2018) and ECB-Eurostat-OECD (2013) to establish a typology of CFIs along with their balance sheet structure.

4.1.1 Holding corporations

A holding features a majority of direct investment equity on the assets side and on the liabilities side of its balance sheet (Table 7.1). To be considered as direct investment, the holding should own at least 10% of the voting power (or capital share) in its direct affiliate.

Table 7.1: Prototype balance sheet of holding corporations

Holding the assets (owning controlling level of equity, *E_DI_A*) of subsidiary corporations…

Variants of prototype balance sheet		Assets	Liabilities
Non-Financial Assets		Yes	
Direct investment	**Equity**	***E_DI_A***	***E_DI_L***
	Debt		
Portfolio investment	**Equity**		
	Debt		
Other investment	**Loans**		
	Currency & Deposits		

…on behalf of its parents (*E_DI_L*) or its direct shareholder affiliated to the same parent

Source: Di Filippo and Pierret (2020a), adapted from IMF (2018)

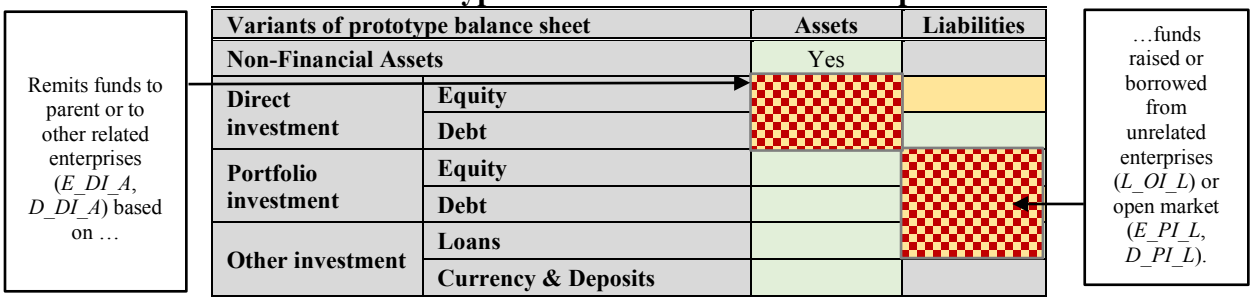
Holdings can take the form of pure and mixed holdings. While the former confine their role to owning controlling-level amount of equity in one or more subsidiaries in a passive manner, without providing any other service to their subsidiaries, the latter can perform other ancillary activities. Such additional activities can cover the granting of loans (in the form of credit facilities or cash advances to affiliates), the pooling of cash between affiliates, the management of foreign exchange rate risk, the holding of intellectual property (IP) rights arising from R&D activities inside the group, *etc*.

4.1.2 Conduit corporations

Conduits raise or borrow funds from unrelated enterprises or the open market and remit those funds to its parent or to other affiliated enterprises. Conduits typically do not transact on the

open markets on the assets side. A synonym for conduit is external financing. A conduit's balance sheet includes a majority of equity or debt (as direct investment) on the assets side. On the liabilities side, equity (as direct investment) and external funding predominate (Table 7.2). External financing takes the form of equity and debt (as portfolio investment) and loans (as other investment).

Table 7.2: Prototype balance sheet of conduit corporations

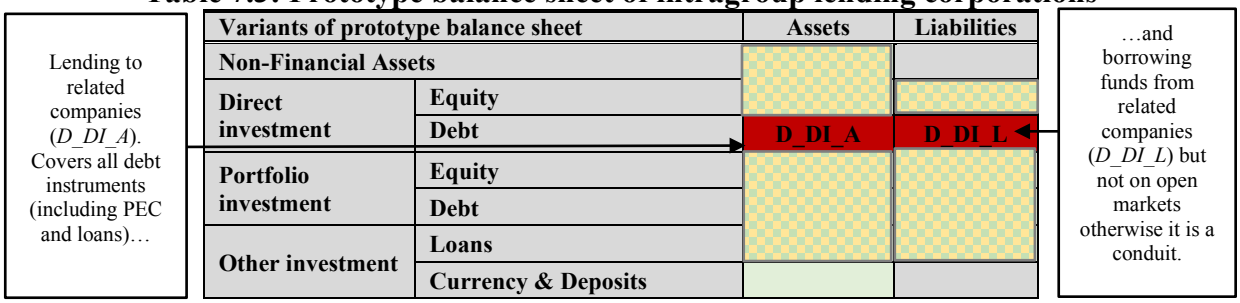


Source: Di Filippo and Pierret (2020a), adapted from IMF (2018)

4.1.3 Intragroup lending corporations

Intragroup lending corporations perform lending from and to related companies (Table 7.3). The balance sheet of intragroup lending corporations regroups a majority of debt (as direct investment) on both sides of the balance sheet. On the liabilities side, equity (as direct investment) and debt (as direct investment) can represent the major items, but debt always predominate over equity. Hence:

Table 7.3: Prototype balance sheet of intragroup lending corporations



Source: Di Filippo and Pierret (2020a), adapted from IMF (2018)

4.1.4 Captive factoring and invoicing corporations

Captive factoring and invoicing corporations concentrate the accounts receivable (i.e. invoices or sales claims) of a group. They sell these invoices owed by clients to a third party called "the factor". The latter purchases these invoices and proceeds to an immediate but partial settlement of up to 90% of the amount of the receivables transferred to the captive factoring. The factor then collects the full invoice payment by the client of the group. As a last step, the factor deducts its factoring fees (the discount) and returns the remaining invoice amount. Factoring fees are typically small, so that the captive factoring should receive potentially about 97-99% of the original invoice amount once the factor receives the full payment from the client of the group. According to ECB-Eurostat-OECD (2013), captive factoring should be classified under the NACE Rev. 2 section K6499 "*Other financial service activities, except insurance and pension funding activities, n.e.c.*".

Table 7.4 defines the prototype balance sheet of captive factoring and invoicing corporations. On the assets side of their balance sheet, captive factoring companies hold a majority of debt (as direct investment) as well as currency and deposits (as other investment) since the latter regroup accounts receivable and invoices. On the liabilities side, equity (as direct investment) and debt (as direct investment) represent the major items.

Table 7.4: Prototype balance sheet of captive factoring and invoicing corporations

	Variants of prototype balance sheet		Assets	Liabilities
Concentrate sales claims and invoicing sales of enterprises	**Non-Financial Assets**		Yes/No	
	Direct investment	**Equity**		
		Debt		
	Portfolio investment	**Equity**		
		Debt		
	Other investment	**Loans**		
		Currency & Deposits		

Source: Di Filippo and Pierret (2020a), adapted from IMF (2018)

4.1.5 Captive financial leasing corporations

Captive financial leasing corporations provide a loan agreement in which they, as lessor, purchase the assets on behalf of the lessee for economic use. In return, the lessee proceeds to periodical fixed rental repayments of the principal and interest. The lessee is considered to have ownership of the asset. This means that the asset appears on the balance sheet of the lessee and not

on the balance sheet of the lessor. Usually, a unique lessee utilises the asset over the leased period. The latter lasts longer than that of an operational lease and usually exceeds the economic life of the asset. The lessee retains the risks of the leased asset and bears the expense and running costs associated with its use. At the end of the lease term, the financial lease provides the lessee with an option to purchase the leased asset at less than the asset's fair market value. Financial lease generally includes expensive assets like aircraft, freight or passenger trains, boats, plants and machineries, drilling rigs, land and office buildings, *etc*. Financial leasing corporations relate to the institutional sector S127, with the NACE Rev. 2 classification code K6491 "Financial leasing" (UN (2008)).

The balance sheet of captive financial leasing corporations share similar characteristics with intragroup lending corporations (Table 7.5). The assets side regroups a majority of debt (as direct investment) as the loan granted by the captive financial leasing usually features a long maturity. On the liabilities side, equity (as direct investment) and debt (as direct investment) represent the major items, but debt predominates over equity. As the lessor does not have ownership of the fixed assets to be leased (see *infra*), the balance sheet of captive financial leasing corporations excludes non-financial assets.

Table 7.5: Prototype balance sheet of captive financial leasing corporations

Prototype balance sheet (IMF (2018))		Assets	Liabilities
Non-Financial Assets		No	
Direct investment	**Equity**		
	Debt		
Portfolio investment	**Equity**		
	Debt		
Other investment	**Loans**		
	Currency & Deposits		

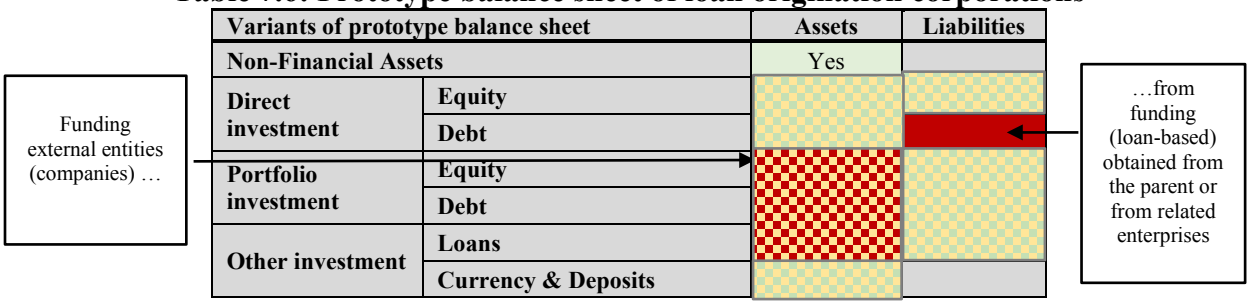
Source: IMF (2018)

Since captive financial leasing corporations feature a unique NACE code across the different types of CFIs, the paper identifies captive financial leasing corporations based on the NACE Rev. 2 classification code K6491. The NACE code is provided by the STATEC.

4.1.6 Loan origination corporations

A loan origination corporation finances companies external to the group to which it belongs, based on funding obtained from the parent or from related enterprises. On the assets side of their balance sheet, loan origination corporations provide external financing in the form of loans, (as other investments), equity and debt (both as portfolio investment). On the liabilities side, equity and debt both as direct investment represent the major items, but debt predominates over equity. Thus:

Table 7.6: Prototype balance sheet of loan origination corporations



Source: Di Filippo and Pierret (2020a), adapted from IMF (2018)

4.1.7 Securitisation vehicle corporations

Securitisation vehicles or financial vehicle corporations (FVC) carry out securitisation transactions[15]. The balance sheet of securitisation vehicles features predominant loans (as other investment) on the assets side. Their balance sheet may include non-financial assets, but this is not a prerequisite. On the liabilities side, debt (as portfolio investment) represent the major item. The prototype balance sheet allows for changes concerning the relative importance of the other items.

[15] The securitisation process involves four steps. In the first step, a company (the originator) selects various assets that it wishes to sell or remove from its balance sheet. These assets are individually illiquid and generate regular cash flows (such as interest, dividends, royalties, regular payments from customers or other ongoing revenues). In the second step, the selected assets are pooled together and transferred to a securitisation vehicle (SV). In a third step, the SV issues interest-bearing securities in the market. The SV thus finances the acquisition of these pooled assets *vis-à-vis* the originator by issuing interest-bearing debt securities in the market, whose interest and principal payments depend on and are backed by the assets transferred.

Table 7.7: Prototype balance sheet of securitisation vehicle corporations

They securitise assets.

Variants of prototype balance sheet		Assets	Liabilities
Non-Financial Assets			
Direct investment	**Equity**		
	Debt		
Portfolio investment	**Equity**		
	Debt		
Other investment	**Loans**		
	Currency & Deposits		

They issue debt securities, other debt instruments, securitisation fund units, and/or financial derivatives and/or legally or economically own assets underlying the issue of these financing instruments that are offered for sale to the public or sold based on private placements.

Source: Di Filippo and Pierret (2020a), adapted from IMF (2018)

In Luxembourg, the Law of 22 March 2004 regulates securitisation vehicles. Given that the latter relate to sector S125 "*Other financial intermediaries, except insurance corporations and pension funds*"[16], they should not be part of the typology on CFIs.

4.1.8 Personal and family wealth-holding entities

Wealth-holding entities manage personal wealth for individuals or families by holding financial and non-financial assets. Wealth-holding entities include foundations, limited liability companies and family trusts[17], which fall under the category NACE Rev. 2 Section K 6430 "*Trusts, funds and similar financial entities*".

The assets side of wealth-holding entities features several predominating items, including equity (whether as direct or portfolio investment), debt securities (whether as direct or portfolio investment) and currency and deposits (as other investment). The liabilities side shares similar characteristics with that of holding corporations with a majority of equities (as direct investment). However, contrary to holding companies, the balance sheet of wealth-holding companies always includes non-financial assets.

[16] See EC (2013)'s European System of Accounts ESA2010 p. 41.
[17] However, according to UN (2008)'s SNA, if a trust deals with individuals and families on the open market, it should be classified under the appropriate financial subsector, for example, as non-MMF investment funds (S124).

Table 7.8: Prototype balance sheet of personal and family wealth-holding entities

Prototype balance sheet (IMF (2018))		Assets	Liabilities
Non-Financial Assets		Yes	
Direct investment	Equity		
	Debt		
Portfolio investment	Equity		
	Debt		
Other investment	Loans		
	Currency & Deposits		

Source: IMF (2018)

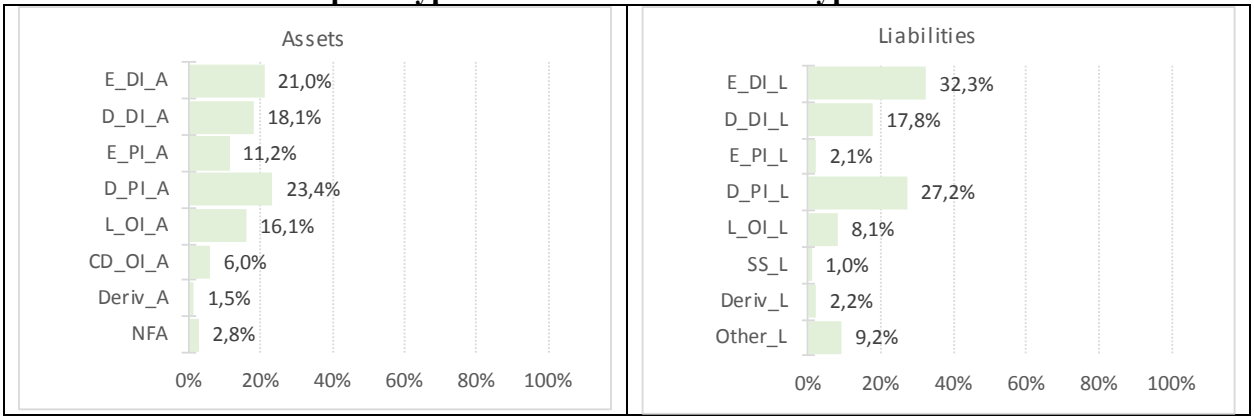
Since wealth-holding entities feature a unique NACE code across the different types of CFIs, the paper identifies wealth-holding entities based on the NACE Rev. 2 classification code K64.305. The NACE code is provided by the STATEC.

4.1.9 Mixed structures

Di Filippo and Pierret (2020a) pointed to the relative importance of CFIs whose balance sheet features mixed activities in Luxembourg. This category - labelled as mixed structures - does not cover borderline cases that are difficult to classify in the typology. Rather, it includes specific prototype balance sheets that are unique and distinct from to the other types of CFIs. In particular, Di Filippo and Pierret (2020a) decomposed mixed structures into three main sub-categories: a mix of holding and intragroup lending corporations, companies declaring losses (negative capital) all over their living period and other mixed structures. Mixed structures should not be confused with mixed holdings which can carry out mixed activities but whose stylised feature is the predominance of equity as direct investment on both sides of the balance sheet.

Table 7.9 taken from Di Filippo and Pierret (2020a) presents the representative prototype balance sheet of CFIs qualifying as "other mixed structures". The table reports the average proportion of each balance sheet item across entities available in the BCL reporting, over the period Q4 2014 – Q4 2019. On the assets side, the most important balance sheet item relates to debt securities as portfolio investment (23.4%), followed by equity securities (21.0%) and debt securities (18.1%) both as direct investment. On the liabilities side, the most important item pertains to equity securities as direct investment (32.3%) and debt securities as portfolio investment (27.2%).

Table 7.9: Estimated prototype balance sheet of the sub-type "other mixed structures"



Source: Di Filippo and Pierret (2020a). Estimations based on the BCL reporting covering CFIs whose total assets are larger than EUR 500 million.

4.1.10 Predominant non-financial assets and extra-group loan origination

Beyond the aforementioned types of CFIs, Di Filippo and Pierret (2020a) highlighted new types of CFIs that could be peculiar to the case of Luxembourg. These new types feature companies with predominant non-financial assets (NFA) and extra-group loan origination corporations.

The prototype balance sheet of predominant NFA corporations (Table 7.10) feature non-financial assets as the major item on the assets side of their balance sheet. No condition prevails on the liabilities side.

Table 7.10: Prototype balance sheet of predominant NFA

Predominant NFA		A	L
Non-Financial Assets			
Direct investment	Equity		
	Debt		
Portfolio investment	Equity		
	Debt		
Other investment	Loans		
	Currency & Deposits		

Table 7.11: Prototype balance sheet of extra-group loan origination

Extra-group loan origination		A	L
Non-Financial Assets			
Direct investment	Equity		
	Debt		
Portfolio investment	Equity		
	Debt		
Other investment	Loans		
	Currency & Deposits		

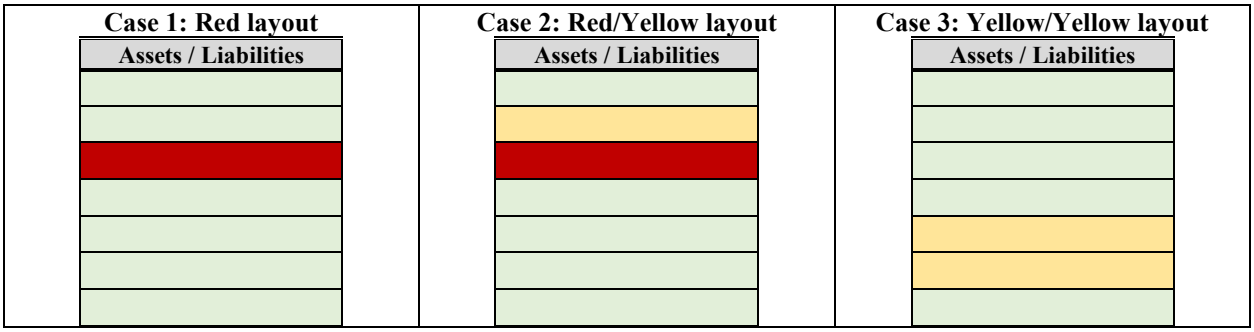
The prototype balance sheet of extra-group loan origination corporations (Table 7.11) use loans obtained from third parties outside the group to finance specific assets, namely equity and debt securities (both as portfolio investment) and loans (as other investment). To avoid duplicates with the assets side of the other types of CFIs, extra-group loan origination corporations cannot

finance the following types of assets: equity and debt securities (both as direct investment), currency and deposits and non-financial assets.

4.2 Qualitative approach

The identification of the type of CFI within the typology relies on qualitative criteria. The latter analyse the relative predominance of a given balance sheet item over the others. The methodology considers three potential balance sheet layouts.

The first layout (*Red layout*) characterises a balance sheet where only one item predominates strongly over the others. The second layout (*Red/Yellow layout*) represents a balance sheet where one item (*Red*) predominates over the others but with a second item (*Yellow*) which features a relative importance compared to the remaining ones. The first item is thus larger than the second item. The third layout (*Yellow/Yellow layout*) features a balance sheet where no single item predominates over the others but where the sum of two items represents the majority of the balance sheet. The charts below present the three potential balance sheet layouts:



To distinguish between the three layouts, the paper implements a simple methodology applied to the balance sheet of each CFI at each period. The first step starts by classifying the balance sheet items from the largest to the lowest in terms of proportion in the total balance sheet of a given CFI. Hence:

$$S=\{s_1, s_2, \dots, s_N\}$$

Where $s_i > s_j$ for all $i > j$, for $i = 1, \dots, N$ and $j = 1, \dots, N$ and $i \neq j$

With $s_i = \frac{Balance\ sheet\ item^i}{Total\ Assets}$ and $s_j = \frac{Balance\ sheet\ item^j}{Total\ Assets}$

A second step identifies the respective layouts based on three conditions. The *existence criterion* analyses whether a specific item features a positive amount and thus exists in the balance sheet. The *predominance criterion* tests whether a specific item predominates over the others in the balance sheet. The *relative predominance criterion* checks whether any second item predominates over the remaining ones (excluding the first predominant item). To this end, this latter condition relies on an indicator of statistical dispersion applied to the distribution of the proportions of a company's balance sheet items.

Hence, in the *Red layout*, the *Red* item s_1 must fulfil the following conditions:

$$\textit{Red layout} \Leftrightarrow \begin{cases} \textit{Existence criterion}: \quad s_1 > 0 \\ \textit{Predominance criterion}: s_1 > (1 - s_1) \\ \textit{Strong predominance over the second largest item}: (s_1 - s_2) > \sigma^2/\mu \end{cases}$$

In the *Red/Yellow layout*, the *Red* item s_1 and the *Yellow* item s_2 must respect the following conditions:

$$\textit{Red / Yellow layout} \Leftrightarrow \begin{cases} \textit{Existence criterion}: \quad s_1 > 0 \text{ and } s_2 > 0 \\ \textit{Predominance criterion}: s_1 > (1 - s_1) \\ \textit{Weak predominance over the second largest item}: (s_1 - s_2) \leq \sigma^2/\mu \end{cases}$$

In the *Yellow/Yellow layout*, the *Yellow* item s_1 and the *Yellow* item s_2 must fulfil the following conditions:

$$\textit{Yellow / Yellow layout} \Leftrightarrow \begin{cases} \textit{Existence criterion}: \quad s_1 > 0 \text{ and } s_2 > 0 \\ \textit{Non-predominance criterion}: s_1 \leq (1 - s_1) \\ \textit{Non-predominance criterion}: s_2 \leq (1 - s_2) \end{cases}$$

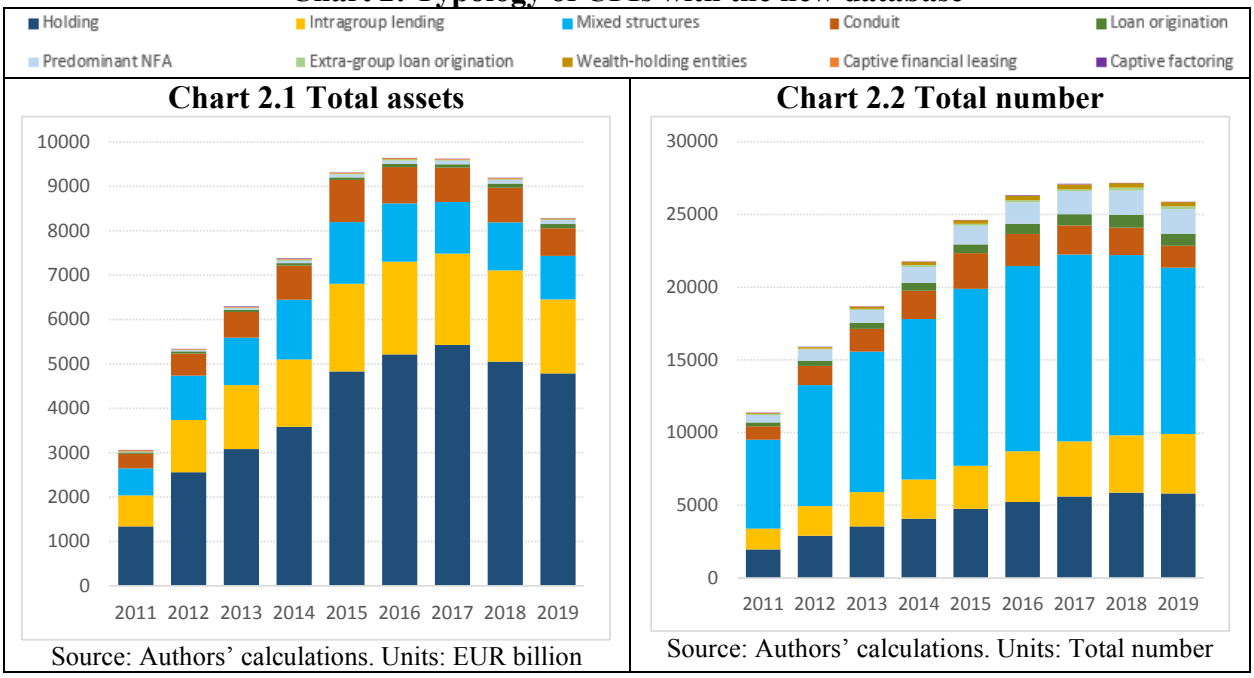
Altogether, the paper applies the aforementioned methodology to the prototype balance sheets of CFIs to draw a typology of sector S127 in Luxembourg.

5. Results from the new database

5.1 Typology of CFIs in Luxembourg

Chart 2.1 presents the typology of CFIs by total assets held. On average over the period 2011-2019, the most important asset holders are holding corporations (52%), followed by intragroup lending companies (22%), mixed structures (15%), conduits (9%) and loan origination companies (1%). These corporations represent about 99% of the total assets held by CFIs. The remaining types that complete the population of CFIs consist of companies with predominant non-financial assets, extra-group loan origination firms, wealth-holding entities, captive financial leasing corporations, and captive factoring and invoicing corporations.

Chart 2: Typology of CFIs with the new database



Source: Authors' calculations. Units: EUR billion

Source: Authors' calculations. Units: Total number

Chart 2.2 presents the typology of CFIs by total number. On average over the period 2011-2019, the population of CFIs regroups mixed structures (49%), holding corporations (20%), intragroup lending companies (13%), conduits (8%) and companies with predominant non-financial assets (5%). These corporations represent about 96% of the total number of CFIs. The remaining types that complete the sample of CFIs consist of loan origination companies, extra-

group loan origination firms, wealth-holding entities, captive factoring and invoicing corporations, and captive financial leasing corporations.

Altogether, the relative proportions of the various types of CFIs differ depending on whether the typology is considered by total assets or by total number. While holding corporations holds the majority of total assets, the largest number of companies consists of mixed structures.

5.2 Typology of CFIs across balance sheet sizes

Typology of CFIs: a comparison between the new database and the BCL reporting

For sake of robustness, the paper compares the results of the typology from the new database with the typology proposed in Di Filippo and Pierret (2020a) based on the BCL reporting. As the latter considers only CFIs with total assets larger than EUR 500 million, the paper selects CFIs that suits the aforementioned balance sheet size in the new database.

Charts 3 and 4 compare the results of the typology between the new database and the BCL reporting, by considering respectively the total number and the total assets of CFIs.

While the data is available in yearly frequency from 2011 to 2019 in the new database, the BCL reporting compiles data at monthly frequency from December 2014 to September 2021. For sake of comparison, the paper presents the typology based on the BCL reporting in annual frequency, over the period 2014 to 2019.

Chart 3: Total number of CFIs with total assets larger than EUR 500 million

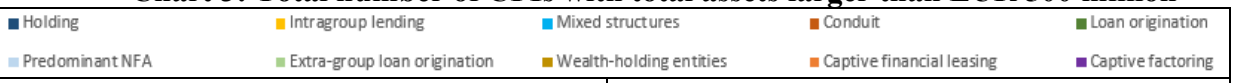
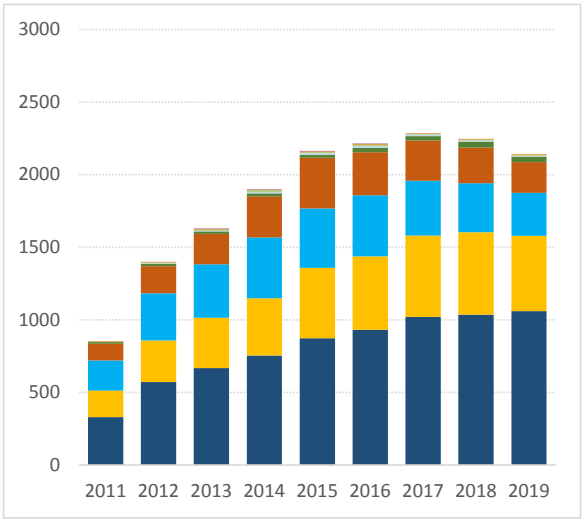
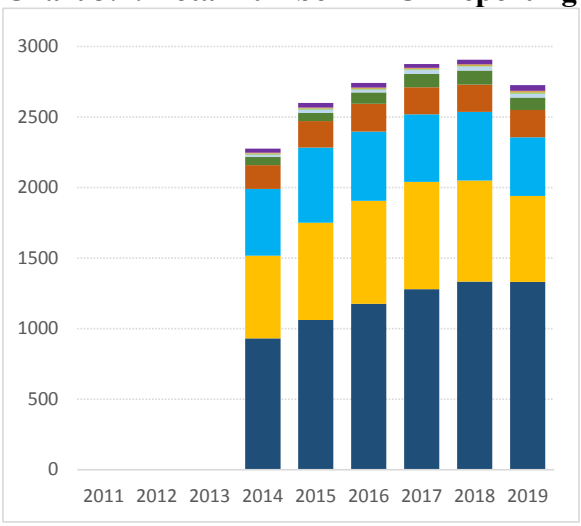


Chart 3.1: Total number – new database



Source: Authors' calculations. Units: Total number

Chart 3.2: Total number – BCL reporting



Source: Authors' calculations. Units: Total number

Chart 4: Total assets of CFIs with total assets larger than EUR 500 million

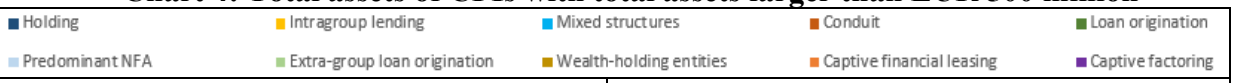
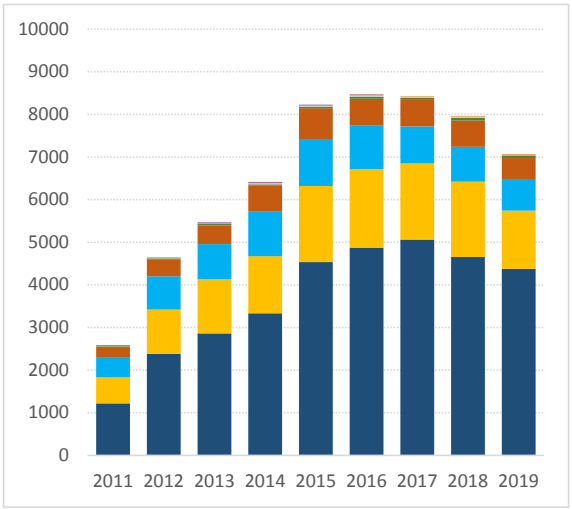
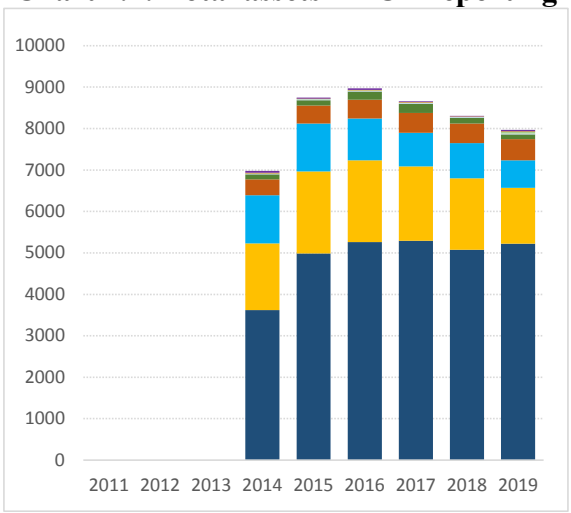


Chart 4.1: Total assets – new database



Source: Authors' calculations. Units: EUR billion

Chart 4.2: Total assets – BCL reporting



Source: Authors' calculations. Units: EUR billion

In terms of total number (Chart 3) and total assets (Chart 4), the typology of CFIs between the new database and the BCL reporting shares similar characteristics. Both charts point to the relative importance of holding corporations, intragroup lending companies, mixed structures and conduits. Apart from that, some differences prevail between the new database and the BCL reporting.

A first difference pertains to the fact that the total assets and the total number are larger in the BCL reporting than in the new database. This observation prevails all over the period 2014-2019. This difference can be explained by missing data in the CBSR. Indeed, the new database use accounting data available from the standardised chart of accounts in the CBSR, provided that CFIs publish their accounts in a specific electronic format on the electronic platform of the Luxembourg Business Register. Some CFIs may not publish their standardised chart of accounts in the required specific electronic format but provide only the consolidated annual accounts at the group level. In this case, no data is available in the CBSR. On the contrary, the BCL reporting gathers periodic balance sheet items data for CFIs resident in Luxembourg and whose total assets are at least equal to EUR 500 million. In addition, the BCL performs regular data revisions and estimations to avoid discontinued series due to missing or delayed data updates. As a result, from the perspective of updating and handling missing data over time, the BCL reporting is more reliable, at least for CFIs with balance sheet size larger than EUR 500 million.

A second difference pertains to the statistical treatment of foreign branches belonging to resident CFIs. While the CBSR includes all the assets/liabilities held/issued by foreign branches in the financial statements of resident CFIs, the BCL reporting does not include those assets/liabilities. Indeed, only resident CFIs should report to the BCL[18]. As foreign branches are non-resident units, they do not report to the BCL. However, since a resident CFI must include its domestic and foreign assets in its financial statements, the BCL attempts to estimate the value of the foreign branches belonging to resident CFIs. The valuation of these foreign branches is based on the net asset accounting method or relies on the capital endowment provided by the resident parent. Once determined, the value of the foreign branches is included in the balance sheets of resident CFIs that reports to the BCL.

A third difference stems from slight discrepancies in the relative proportions regarding specific types of CFIs. This is notably the case of conduits where the relative proportion is larger with the new database than with the BCL reporting. This is also the case of intragroup lending

[18] According to BCL (2014), "A "resident" company is a legal person under Luxembourgish law, for all activities performed by the head office, by its subsidiaries, affiliated companies and branches based in Luxembourg or any legal person under foreign law, for all activities performed by its branches and headquarters based in Luxembourg."

corporations where the relative proportion is lower with the new database than with the BCL reporting. This can be explained by the availability of different means between both databases to highlight specific types of CFIs.

In particular, the respective databases use different information to disentangle between equity as direct investment (E_DI) or as portfolio investment (E_PI). While the BCL reporting relies on the affiliation link, the new database uses the label of specific accounting items available in the standardised chart of accounts. Indeed, the latter benefits from a higher level of granularity concerning financial information (see *infra*, Tables 5.1 and 6.1).

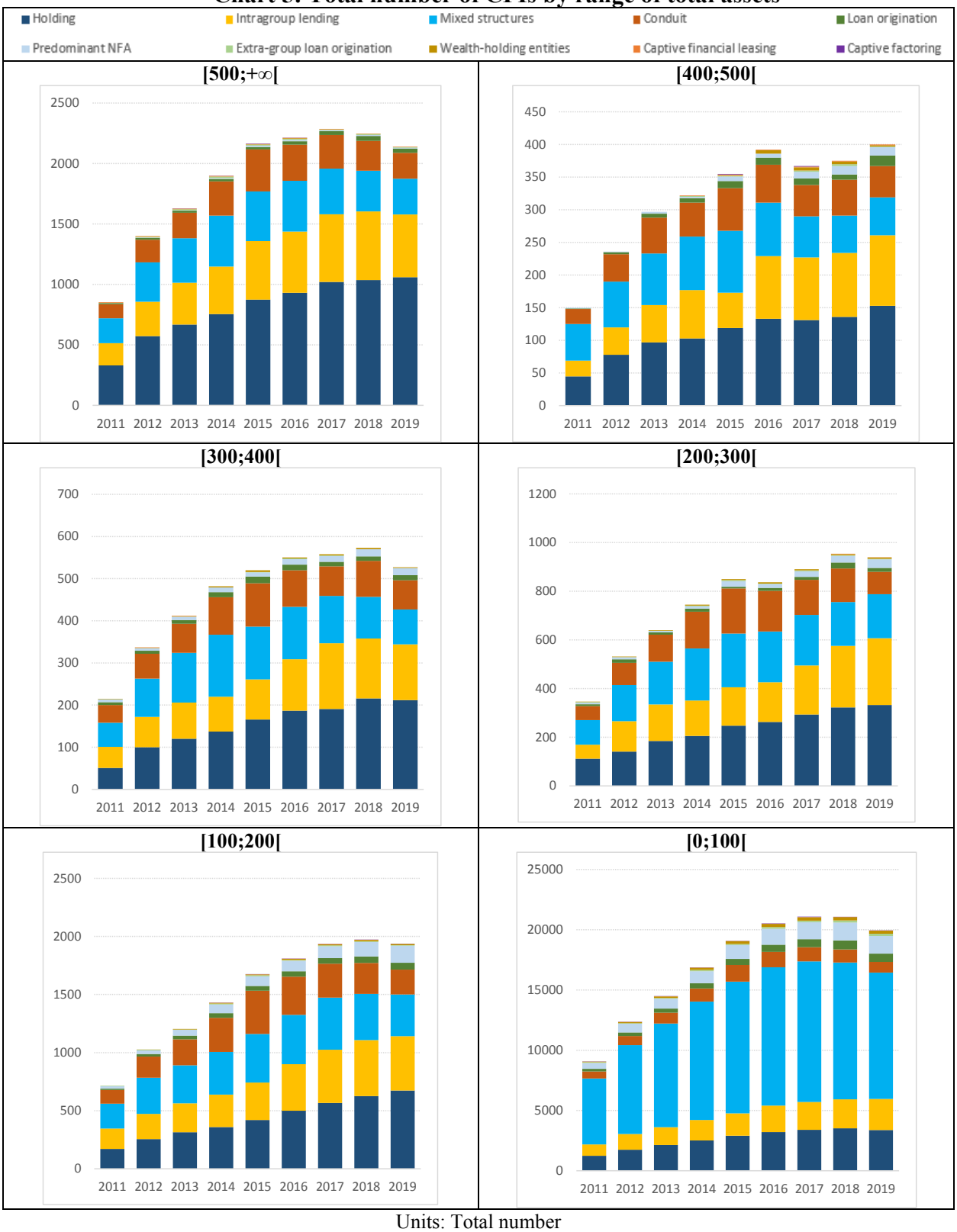
The use of different information to disentangle between debt as direct investment (D_DI) and debt as portfolio investment (D_PI) can also contribute to explain this third difference. Indeed, the BCL reporting differentiates hybrid and non-hybrid instruments for debt securities based on instruments' negotiability. As a matter of fact, in their typology of CFIs, Di Filippo and Pierret (2020a) considered hybrid instruments as non-negotiable (D_DI) and added them up to intragroup loans (D_DI) while non-hybrid instruments were negotiable and allocated to debt securities as portfolio investment (D_PI). This distinction between hybrid and non-hybrid instruments is not possible with the financial information available in the standardised chart of accounts.

Typology of CFIs across ranges of total assets

Altogether, for CFIs with total assets larger than EUR 500 million, the typology based on the new database broadly shares similar characteristics with the typology of CFIs implemented in Di Filippo and Pierret (2020a) with the BCL reporting. Hence, a natural question that arises is in what range of total assets does the proportion of mixed structures increase?

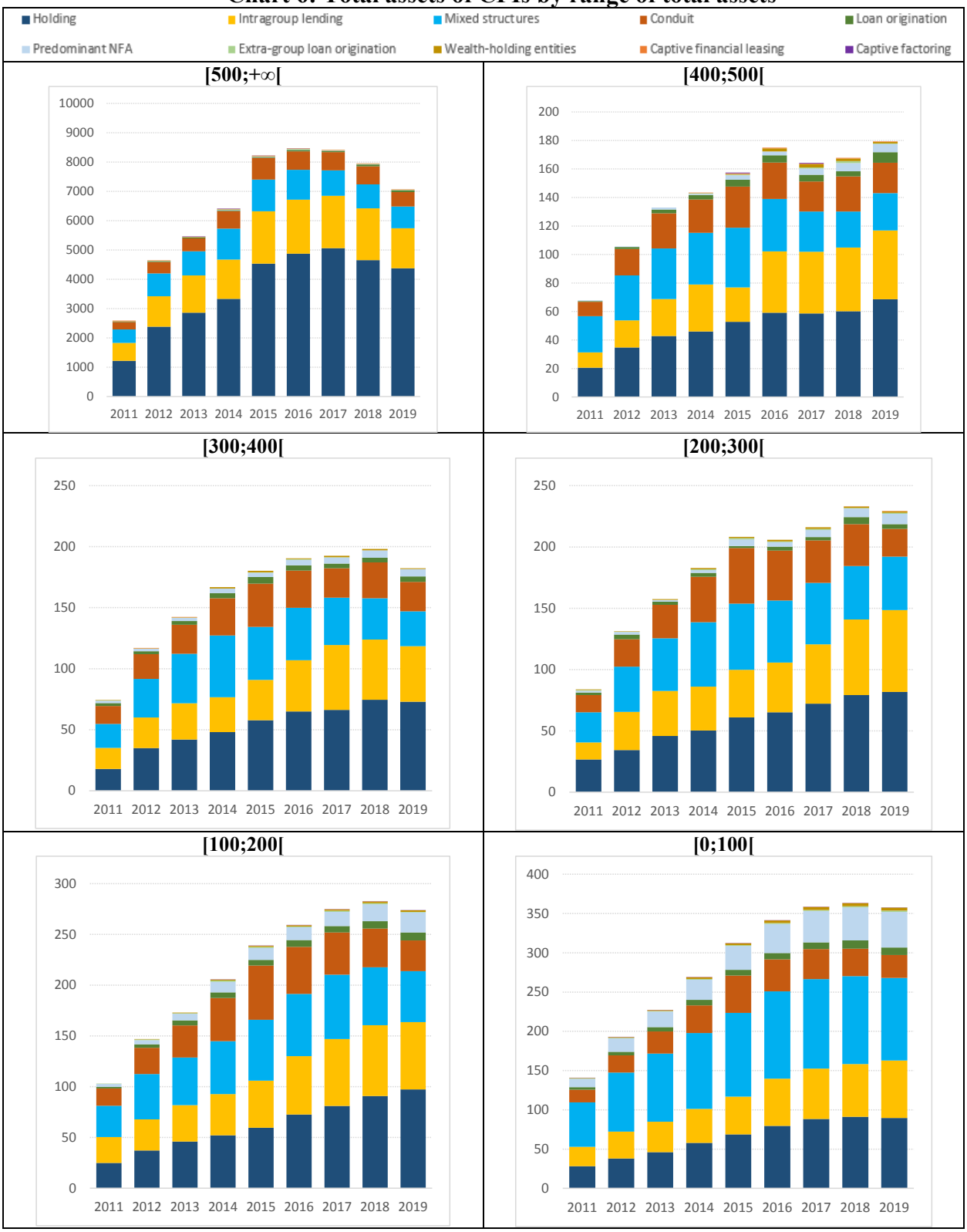
To address this question, Charts 5 and 6 present the typology of CFIs across various ranges of balance sheet sizes, spanning [500;+∞[, [400;500[, [300;400[, [200;300[, [100;200[and [0;100[.

Chart 5: Total number of CFIs by range of total assets



Units: Total number

Chart 6: Total assets of CFIs by range of total assets



Units: EUR billion

The charts show that CFIs present different characteristics depending on their balance sheet size. On the one hand, CFIs with total assets larger than EUR 100 million mainly regroup holding companies, intragroup lending corporations, mixed structures and conduits. On the other hand, CFIs with total assets lower than EUR 100 million feature in majority mixed structures.

Mixed structures bring together a mix of holding and intragroup lending corporations, companies declaring losses (negative capital) all over their living period and other mixed structures. The prototype balance sheets of mixed structures are distinct from the prototype balance sheets of the other types of CFIs.

A possible explanation relating to the use of mixed structures by MNEs is that they reduce costs and increase organisational efficiency. Indeed, mixed structures concentrate on different types of activities within a single structure, instead of resorting to multiple entities that perform a specific activity. This suggests that a mixed structure could for example combine the activities of an intragroup lending corporation and a pure holding corporation.

In addition, although the relative proportions of the various types of CFIs differ across various ranges of total assets, they remain stable over time within a given range of total assets. This observation holds when observing the typology of CFIs whether by total number or by total assets.

Eventually, the evolution of the total number and total assets of CFIs shares similar characteristics across ranges of total assets and across types of CFIs. They trend upward from 2011 to 2015, and then slowdown or lower after 2015. However, the timing and magnitude of the trend reversal differ depending on the type of CFI. In retrospect, the relative importance of the upward trend over the period 2011-2015 can be explained by an increase in the use of CFIs by MNEs as well as by improvements in the data coverage brought to the EGR and CBSR databases from statistical offices.

5.3 Switch in the type of CFIs over time

Although the relative proportions of each type of CFI remain stable within a given range of total assets, a given CFI may switch from one type to another over time. To address the question of type switching, Table 8 computes the average probability of switching from one type (in

column) to another (in rows) over the period 2012-2019. A given type of CFI can switch to another one or simply become inexistent ("No data, change of sector, dissolution"), owing to data availability in the CBSR or to a change of sector or to dissolutions relating to various financial reasons (*e.g.* liquidations, mergers and scissions or foreign transfers[19]). The switching probabilities across the different types of CFIs (in columns) sum to 100%.

Table 8: Probability of switching from type to type

Prob(Type *X* in year *t* … / … switches to Type *Y* in year *t*+1)	Holding	Intragroup lending	Mixed	Negative capital	Conduit	Loan origination	Predominant NFA	Extra-group loan origination	Wealth-holding entities	Captive financial leasing	Captive factoring & invoicing
Holding	83%	6%	6%	0%	5%	3%	0%	3%	0%	0%	8%
Intragroup lending	3%	74%	4%	0%	8%	8%	1%	3%	0%	0%	9%
Mixed structure	7%	10%	74%	2%	10%	24%	11%	36%	0%	0%	36%
Negative Capital	0%	0%	0%	90%	0%	0%	0%	0%	0%	0%	0%
Conduit	1%	3%	2%	0%	72%	1%	0%	9%	0%	0%	1%
Loan origination	1%	2%	2%	0%	0%	55%	0%	1%	0%	0%	1%
Predominant NFA	0%	0%	2%	0%	0%	1%	84%	6%	0%	0%	8%
Extra-group loan origination	0%	0%	0%	0%	0%	0%	1%	35%	0%	0%	1%
Wealth-holding entities	0%	0%	0%	0%	0%	0%	0%	0%	93%	0%	0%
Captive financial leasing	0%	0%	0%	0%	0%	0%	0%	0%	0%	95%	0%
Captive factoring & invoicing	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%
No data, change of sector, dissolution	5%	5%	9%	8%	4%	7%	3%	6%	7%	5%	11%

NB: Average probability over the period 2012-2019

The majority of CFIs features the same type over time. For example, the probability that a holding corporation in year *t* keeps its status reaches 83% on average over the period 2012-2019. Conversely, the probability that a holding corporation in year *t* switches to a different type amounts to 12% on average over the period 2012-2019. This stability prevails for all types of CFIs, except for extra-group loan origination companies and for captive factoring and invoicing corporations. For these latter types of CFIs, the probability to switch to a mixed structure is higher. Overall, the low probabilities of switching from a given type of CFI to a different one corroborates the relative stability in the proportions of the various types of CFIs over the sample period.

[19] See Di Filippo and Pierret (2020b)

6. Additional investigations by type of CFIs

6.1 Holding corporations

Charts 7.1 and 7.2 present the evolution of the number and total assets of holding corporations over time. It also decomposes holding companies into pure and mixed holdings (see *infra*, section 4.1.1). On average over the period 2011-2019, pure holding companies account for about 54% of the total number of holding corporations and 58% of the total assets owned by holding corporations. The remaining share represents that of mixed holdings. This result holds across the different ranges of total assets.

Chart 7.1: Total number of pure holding and mixed holding

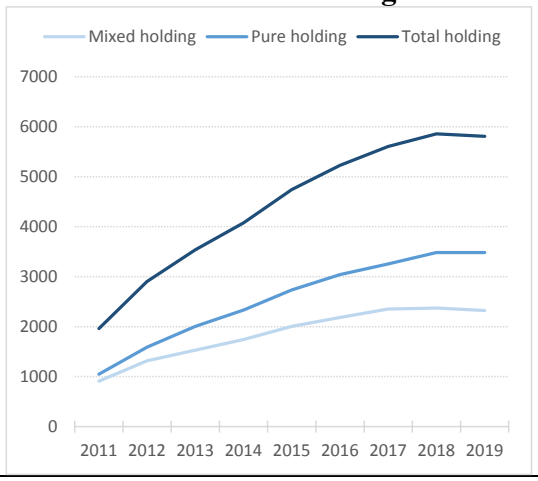
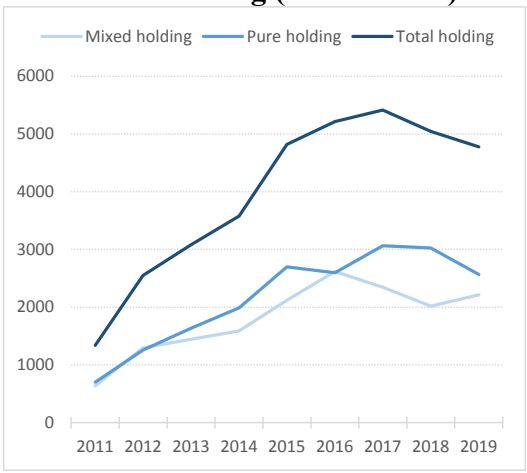


Chart 7.2: Total assets of pure holding and mixed holding (EUR billion)



The total number of holding companies evolves around an upward trend from 2011 to 2018 and lowers in 2019 (Chart 7.1). Both pure and mixed holdings contribute to these dynamics. The decrease is however larger for holding corporations whose balance sheet size is below EUR 100 million (Chart 7.3).

The total assets of holding companies increase from 2011 to 2015 (Chart 7.2). They slowdown in 2016-2017 and decrease in 2018-2019. Both pure and mixed holdings contribute to these evolutions, albeit with different timing and magnitude. The reduction in total assets is however larger for holding corporations whose balance sheet size is larger than EUR 500 million (Chart 7.4).

The number and total assets of CFIs with total assets ranging in the interval [400;500[increase between 2018 and 2019 (Charts 7.3 and 7.4). This suggests that some CFIs dropped their total assets and went below the threshold of EUR 500 million in 2019. This observation was also evidenced in Di Filippo and Pierret (2020b) based on the BCL reporting[20].

Chart 7.3: Total number of holding corporations by range of total assets

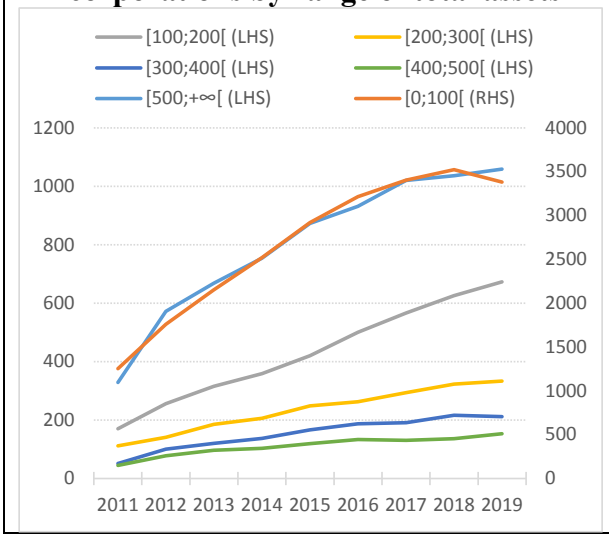
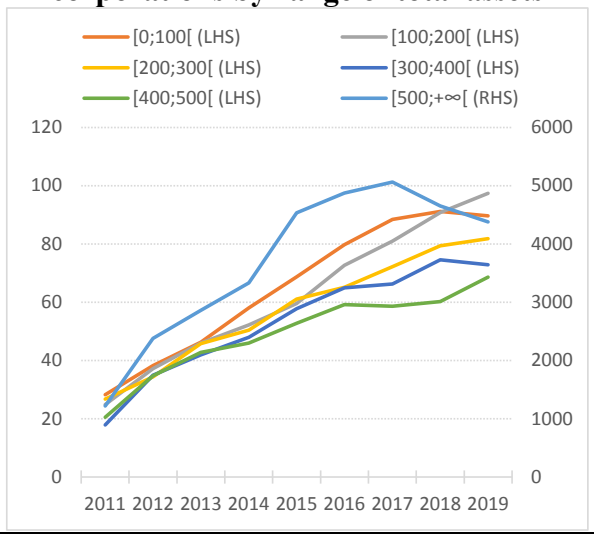


Chart 7.4: Total assets of holding corporations by range of total assets



[20] See "Chart 12: New reporting *versus* non-reporting motives implying a variation in the number of S127 entities" in Di Filippo and Pierret (2020b).

6.2 Intragroup lending corporations

Chart 8.1 presents the evolution of the number and total assets of intragroup lending corporations over the sample period. While the total number of intragroup lending corporations trends upward, the total assets mimic an inverted U-shaped curve. They increase from 2011 to 2016 and decrease thereafter. This evolution at the aggregate level hides discrepancies between intragroup lending corporations, depending on their balance sheet size (Charts 8.2 and 8.3).

Chart 8.1: Total number and total assets (EUR billion) of intragroup lending corporations

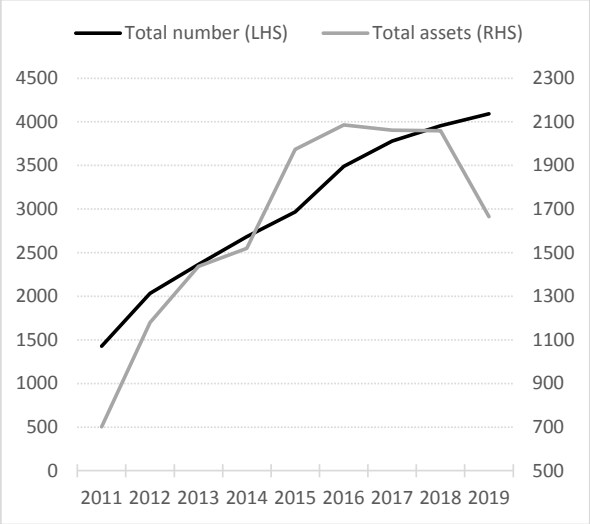


Chart 8.2: Total number of intragroup lending corporations by range of total assets

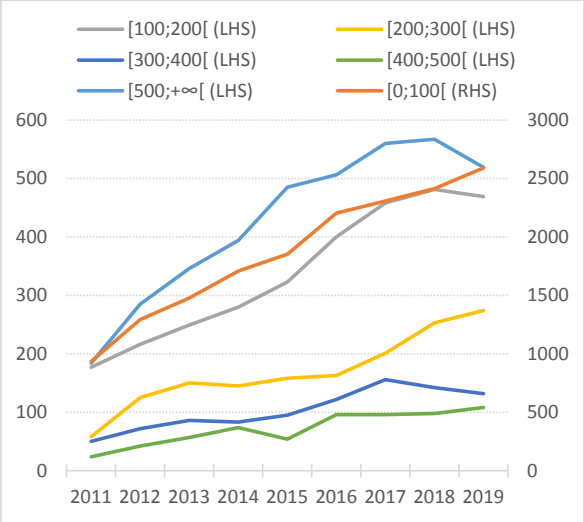
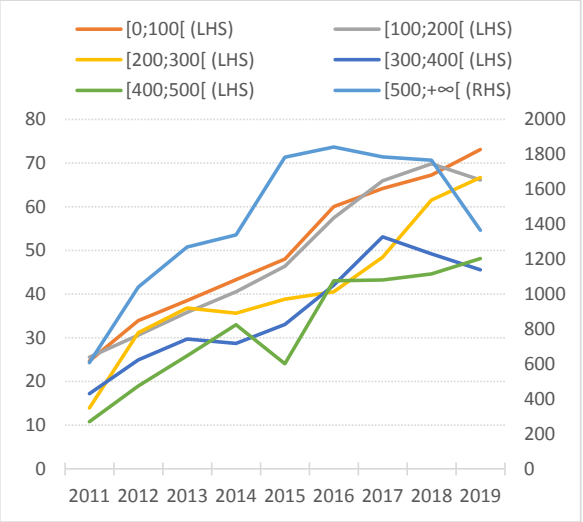


Chart 8.3: Total assets of intragroup lending corporations by range of total assets



6.3 Mixed structures

Mixed structures comprise various sub-types, including a mix of holding and intragroup lending corporations, companies declaring losses (negative capital) all over their living period and other mixed structures.

In terms of number (Chart 9.1) and on average over the period 2011-2019, mixed structures bring together other mixed structures (49%), companies declaring losses (negative capital) all over their living period (44%)[21] and a mix of holding and intragroup lending corporations (7%). In terms of total assets (Chart 9.2) and on average over the period 2011-2019, mixed structures represent a mix of holding and intragroup lending corporations (38%), other mixed structures (34%) and companies declaring losses (negative capital) all over their living period (28%).

Chart 9.1: Total number of sub-types of mixed structures

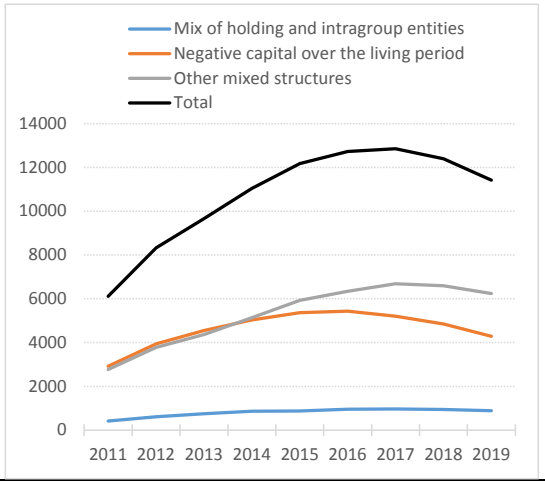
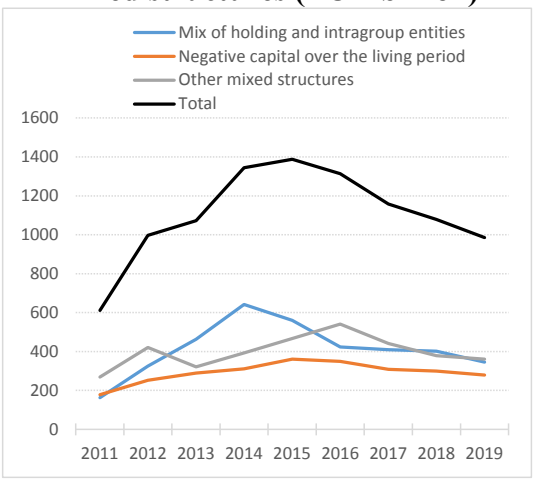


Chart 9.2: Total assets of sub-types of mixed structures (EUR billion)

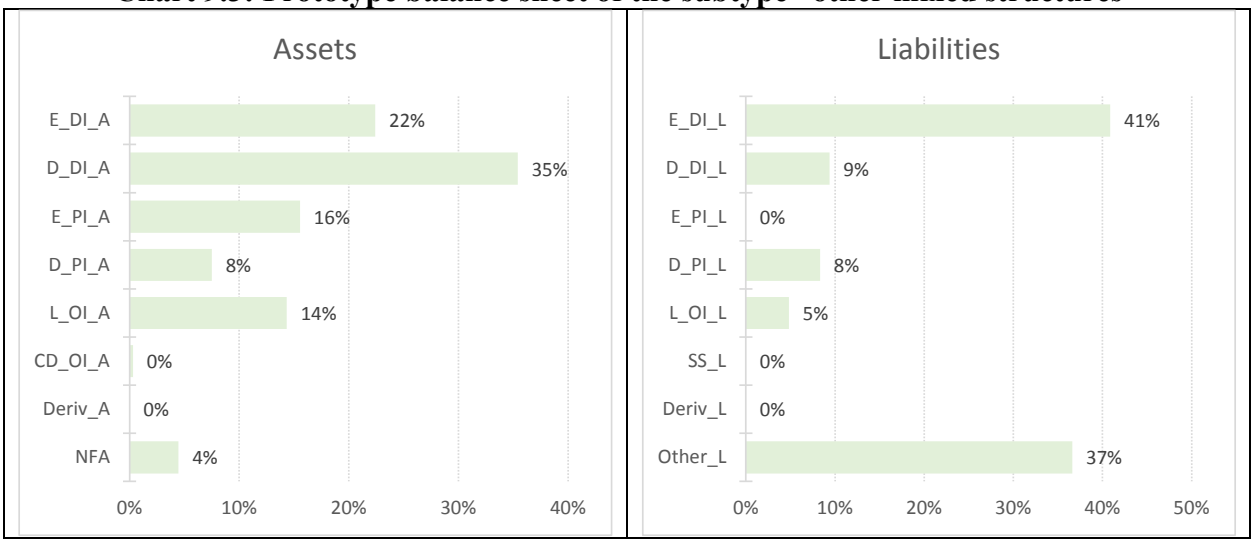


The evolution of the sub-types of mixed structures differs over time. In terms of number (Chart 9.1), they trend upward from 2011 to 2017 and then decrease. In terms of total assets (Chart 9.2), the magnitude, timing and trend differ over time, across the different subtypes of mixed structures. However, from 2016 onwards, their respective total assets trend downward.

[21] Any given company facing a loss in a given year can carry this loss forward, *i.e.* use this loss to offset profits in future years. This allows the company to decrease its income tax base and hence the ensuing tax payments.

Chart 9.3 presents the representative prototype balance sheet of CFIs belonging to the subtype "other mixed structures" by considering the average proportion of each balance sheet item across these entities, over the period 2011-2019.

Chart 9.3: Prototype balance sheet of the subtype "other mixed structures"



On the assets side, the most important balance sheet item relates to debt securities as direct investment (35%), followed by equity securities as direct investment (22%). On the liabilities side, the most important item pertains to equity securities as direct investment (41%) and other liabilities (37%).

6.4 Conduit corporations

Charts 10.1 and 10.2 decompose the liabilities side of conduits. On average over the period 2011-2019, the most important types of conduits feature in majority debt securities on their liabilities side. They represent 69% of the total number of conduits and 76% of the total assets held by conduits. Conduits with major liabilities in loans represent 30% of the total number of conduits and 24% of the total assets held by conduits. Conduits with major liabilities in equity securities represent 1% of the total number of conduits and 1% of the total assets held by conduits.

Chart 10.1: Total number of the variants of conduits

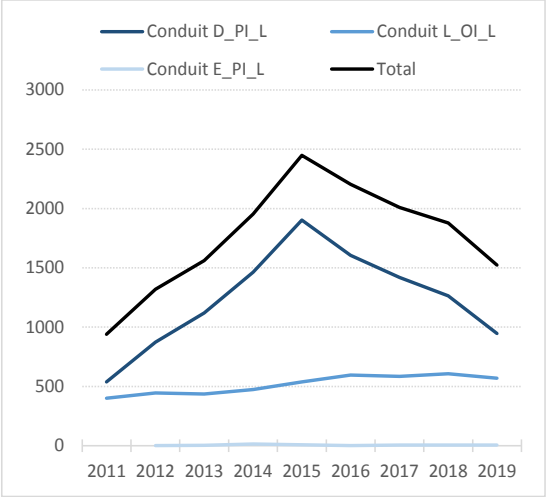
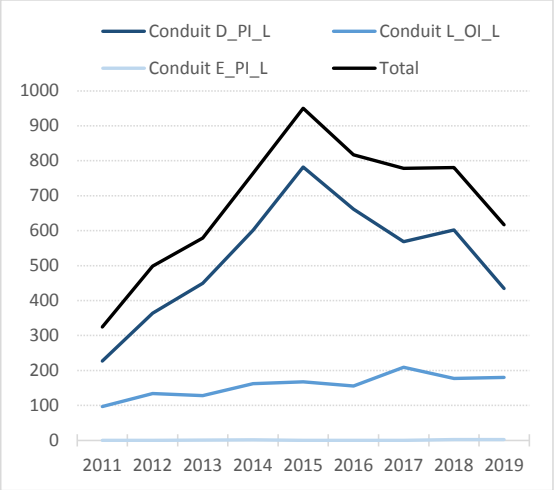


Chart 10.2: Total assets of the variants of conduits (EUR billion)



Whether in terms of number and total assets, conduits with major liabilities in loans trend upward all over the period while conduits with major liabilities in debt securities increase from 2011-2015 and decrease thereafter. The lowering in total assets holds across the different ranges of total assets.

6.5 Loan origination corporations

Charts 11.1 and 11.2 breakdown the assets side of loan origination corporations. In terms of number, loan origination corporations with major assets in equity securities (as portfolio investment) or loans (as other investment) predominate over loan origination corporations whose major assets relate to debt securities (as portfolio investment). In terms of total assets, loan origination corporations with major assets in equity securities (as portfolio investment) predominate over loan origination corporations whose major assets relate to loans (as other investment) or debt securities (as portfolio investment).

Chart 11.1: Total number of the variants of loan origination corporations

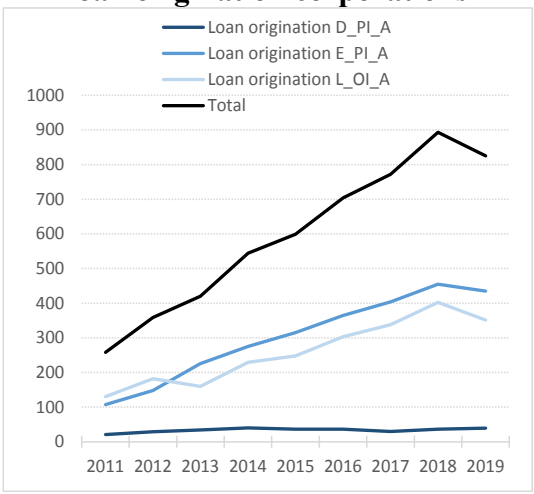
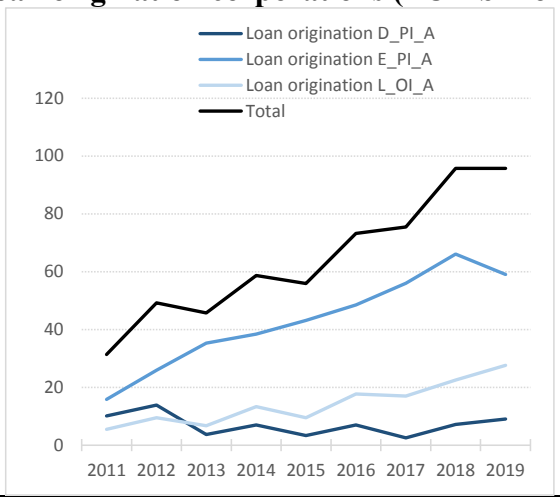


Chart 11.2: Total assets of the variants of loan origination corporations (EUR billion)



While loan origination corporations whose major assets relate to debt securities are stable over time - whether in number or total assets - the other types of loan origination increase from 2011 and 2018 before slowing down or decreasing in 2019. These evolutions hold across the different ranges of total assets.

6.6 Remaining types

Charts 12.1 and 12.2 present the evolution of the remaining types of CFIs. The latter include captive factoring and invoicing corporations, predominant non-financial assets (NFA) companies, extra-group loan origination firms, wealth-holding entities and captive financial leasing corporations. Together, they account for about 1% of the total assets (respectively, 7% of the total number).

Chart 12.1: Total number of the remaining types of CFIs

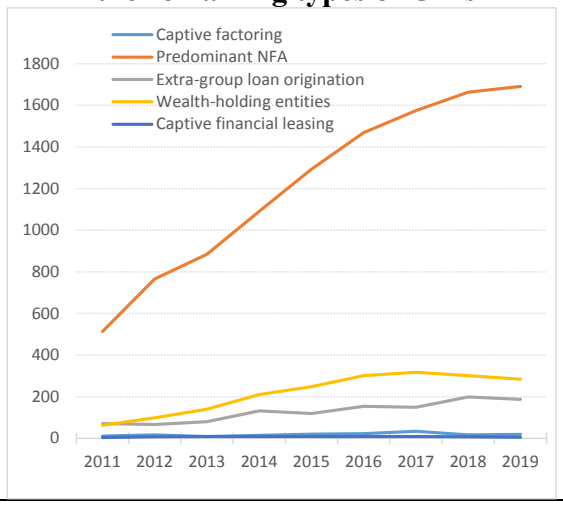
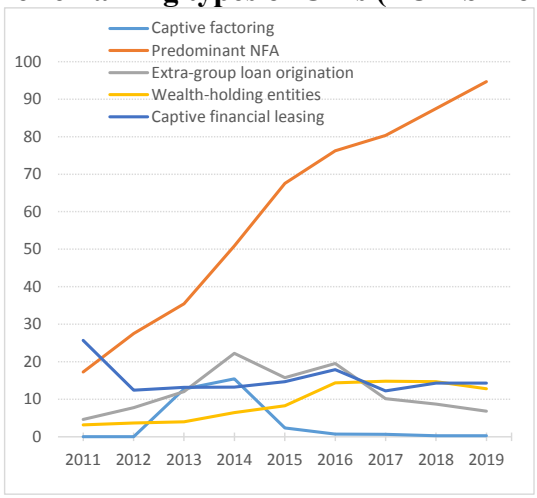


Chart 12.2: Total assets of the remaining types of CFIs (EUR billion)



Amongst the remaining types and on average over the period 2011-2019, corporations with predominant NFA represent the most important type, whether in terms of number (77%) or total assets (57%) owned by the remaining types of CFIs. The relative importance of corporations with predominant NFA grows all over the period. The tangible assets of predominant NFA corporations can cover real estate assets (*e.g.* apartments, buildings and warehouses), transport vehicles (*e.g.* boats, yachts, wagons and aircrafts), stocks and inventories, intellectual property, *etc*.

7. Conclusion

The paper draws a typology of captive financial institutions and money lenders (CFIs, sector S127) in Luxembourg from a new database. The latter retrieves information from three sources: the EuroGroups Register managed by Eurostat, the Statistical Business Register managed by the STATEC (National Institute for Statistics and Economic Studies) and the Central Balance Sheet Register managed by the STATEC. The new database enhances the data coverage of CFIs in Luxembourg. Indeed, it includes not only CFIs with total assets larger or equal to EUR 500 million as in the BCL reporting (BCL (2014)), but also CFIs with total assets lower than EUR 500 million. In turn, this new database allows for a more comprehensive analysis of CFIs in Luxembourg compared to previous studies that used the BCL reporting (Di Filippo and Pierret (2020a, 2020b)).

Results show that CFIs present different characteristics depending on their balance sheet size. On the one hand, CFIs with total assets larger than EUR 100 million mainly regroup holding companies, intragroup lending corporations, mixed structures and conduits. On the other hand, CFIs with total assets lower than EUR 100 million feature mostly mixed structures. Overall, while holding corporations own the majority of total assets, the largest number of CFIs consists of mixed structures.

Mixed structures bring together a mix of holding and intragroup lending corporations, companies declaring losses (negative capital) all over their living period and other mixed structures. The prototype balance sheets of mixed structures are distinct from the prototype balance sheets of the other types of CFIs.

A possible explanation relating to the use of mixed structures by multinational enterprises (MNEs) is that they reduce costs and increase organisational efficiency. Indeed, mixed structures concentrate on different types of activities within a single structure, instead of resorting to multiple entities that perform a specific activity.

Additional investigations show that even if the relative proportions of the various types of CFIs differ across various ranges of total assets, they remain stable over time within a given range of total assets. The analysis of switches by entities from one type to another corroborates the relative stability in the proportions of the various types of CFIs. Indeed, within a given range of total assets, the majority of CFIs features the same type over the sample period.

The evolution of the total number and total assets of CFIs shares similar characteristics across ranges of total assets and across types of CFIs. They trend upward from 2011 to 2015, and then slowdown or lower after 2015. However, the timing and magnitude of the trend reversal differ depending on the type of CFI. In retrospect, the relative importance of the upward trend over the period 2011-2015 can be explained by an increase in the use of CFIs by MNEs as well as by improvements in the data coverage brought to the EGR and CBSR databases from statistical offices.

With hindsight, the new database features advantages and limits compared to the BCL reporting. Indeed, the new database provides annual data over the period 2011-2019, while the BCL reporting gathers monthly data over the period December 2014-September 2021. Hence, the BCL reporting presents shorter delays concerning data updates. In addition, contrary to the BCL

reporting, the new database does not include a breakdown of balance sheet items by geographical counterpart, maturity and currency.

Moreover, the BCL reporting features information about the affiliation link enabling the distinction between equity as direct investment or as portfolio investment. The new database performs the latter distinction by relying on the label of the accounting items available in the standardised chart of accounts. Indeed, the latter benefits from a higher level of granularity concerning financial information. The BCL reporting also includes information about hybrid and non-hybrid instruments to distinguish between debt as direct investment or as portfolio investment. This latter distinction is not possible with the new database.

Besides, the new database can be undermined by missing data. Indeed, it relies on accounting data available from the standardised chart of accounts in the CBSR, provided that CFIs publish their accounts in a specific electronic format on the electronic platform of the Luxembourg Business Register. On the contrary, the BCL reporting gathers periodic balance sheet items data for CFIs resident in Luxembourg and whose total assets are at least equal to EUR 500 million. In addition, the BCL performs regular data revisions and estimations to avoid discontinued series due to missing or delayed data updates. As a result, from the perspective of updating data and handling missing data over time, the BCL reporting is more reliable, at least for CFIs with balance sheet size larger than EUR 500 million.

In spite of these limits, the new database enables a larger coverage of the population of CFIs in Luxembourg by including a larger number of CFIs than those included in the BCL reporting. Indeed, the latter compiles data for CFIs with total assets at least equal to EUR 500 million while the new database also comprehends CFIs with total assets lower than EUR 500 million. In turn, the new database covers a larger share of the population of resident CFIs and allows for a more comprehensive analysis of sector S127.

Altogether, both the new database and the BCL reporting feature pros and cons. Notwithstanding this, these databases should not be viewed as competing against each other but as complementary. Indeed, the use of both databases enables a fine-tuned analysis of CFIs in Luxembourg.

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BANQUE CENTRALE DU LUXEMBOURG

EUROSYSTÈME

2, boulevard Royal
L-2983 Luxembourg

Tél.: +352 4774-1
Fax: +352 4774 4910

www.bcl.lu • info@bcl.lu