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FDI true value: experimenting with market capitalisation ratios to value unlisted FDI equity[1]

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[1] This contribution was prepared for the conference. The views expressed are those of the authors and do not necessarily reflect the views of the European Central Bank, the Bank of Spain, the BIS, the IFC or the other central banks and institutions represented at the event.

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Véronique Genre, Christophe Guette-Khiter and François Robin[1]

Abstract

According to current methodological standards, market valuation should be the basic principle to evaluate FDI equity transactions and positions as well as all other instruments and in coherence with national accounts. While it is easily available in case of equity listed on stock exchanges, compilers need to find a proxy to the value of the equity in case of unlisted equity, which represents the largest part of FDI equity capital.

Current methodological standards recommend a list of methods to approximate the market value with different levels of practical implementation. None of the current manuals clearly indicates which method is preferred leading to potential different choices among countries and, thus, bilateral asymmetries and reduced international comparability.

Many countries rely on the Own Funds at Book Value method (OFBV). Because it is available for all enterprises, it is easy to implement, allows for detailed breakdowns and for smaller asymmetries between countries. However, in the case of France, OFBV values underestimate market values by about half and provide a misleading account of the international net position of the country.

In this paper, we experiment the market capitalisation ratio method using the largest range of available information in order to gauge the costs and benefits, as well as the resources required for such a compilation by external statistics compilers. To do so, we build market ratios from listed shares' data (market value / book value) starting for the Centralised Securities Data Base (CSDB) of the Eurosystem and completed with private databases to get as detailed information as possible regarding sector and country breakdowns across the globe, between 2012 and 2023.

We develop a set of country-by-sector market capitalisation ratios. For robustness purposes and whenever firms' samples are big enough median ratios were applied to individual enterprises to calculate a market value. Whenever the sample of individual firms is too small, we aggregate samples to the upper geography level. This data-intensive method tries to overcome the fact that aggregated capitalisation ratios do not take into account market-specific characteristics. It is also a way to check whether disaggregated series might be published.

[1] The views expressed here are those of the authors and not necessarily that of Banque de France. The authors would like to thank Gian Maria Milesi-Ferretti and other participants at the February 2024 IFC conference on Bank Statistics for their helpful discussions.

Because there are other market valuation methods, we simulate the one relying on market index prices with the same data. Then, we compare both methods.

We finally work on a stock-flow reconciliation model, which should remain valid irrespective of the valuation method. The use of market capitalization ratios now appear in the reconciliation equation, raising a methodological debate. Whereas transactions and exchange rate valuation effects are easy to compile, the allocation of the additional effect between price valuation and other adjustments is not trivial. This experimental exercise raises methodological questions that compilers face in their day-to-day work and may call for additional guidance the background of the current manuals' revision.

Keywords: foreign assets, foreign direct investment

JEL classification: C18, F21, F23, F34

1. Some background

Looking at France's international investment position, foreign direct investment (FDI) in equity is currently published at "mixed value". It means that the listed portion of outstanding FDI, both outbound and inbound, is valued at market value, but the unlisted portion is valued according to own funds at book value (OFBV). In reality, unlisted companies account for 96% of FDI assets and for 77% of liabilities. Hence, the proportion of firms at market value in French data is low.

There usually is a substantial difference between FDI stocks recorded at book value and those recorded at market value, something that is easily spotted whenever an unlisted firm becomes listed on the stock exchange. They often differ for reasons linked to goodwill (such as company's economic development prospects and the valuation of certain intangible assets), some elements of market value that are not taken into account in financial statements. Hence the IMF and the OECD recommend valuing stocks of foreign direct investment at market prices to improve consistency between flows observed at the time of a transaction, - clearly at market value -, and stocks making up the international investment position (OECD, 2009 and IMF, 2015).

In practice, estimating market value for unlisted companies is a complex, data-intensive exercise that only a few countries implement and there is no standardized methodology agreed upon at an international level. Among major OECD countries, Canada and the United States in particular publish aggregate data on their net international investment position at market value, alongside another set of detailed data at book value. European countries, like France, rely on OFBV/mixed value, which allows for relatively homogeneous comparisons within the EU (ECB, 2023).

In France, several experiments in valuing unlisted companies have been carried out (Durant and Massaro, 2004 and Nivat and Topiol, 2010) based on a subset of the enterprise population. Between 2009 and 2013, the annual Balance of Payments Report regularly published aggregate series of FDI at market value in its chapter on the international investment position, in full coherence with national accounts. However, the statistical tables in the appendices only detailed mixed values. From 2014 onwards, this dual publication was discontinued, assumingly due to the difficulty to communicate two different sets of data.

Yet the debate on how to value French FDI stocks remained because of its impact on the overall net investment position. France has a higher density of resident multinational groups than other countries. In 2021, French multinationals (excluding non-market services and banking subsidiaries) controlled 51,000 subsidiaries abroad in more than 190 countries and employed nearly 7 million people abroad (INSEE, 2023), more than a third of domestic employment. They generated over €1,550 billion of annual consolidated sales, just over half of the total consolidated sales of French multinational companies. French FDI assets abroad stood at €1,347 billion, far above inward FDI, at only €834 billion. These imbalances feed into revenue flows for the benefit of the French balance of payments, which together with the US and Japan register among the largest surpluses of FDI revenues in the world (Vicard, 2018). Hence not valuing unlisted equity for France clearly underestimates its actual international net position.

2. Market capitalization valuation

One approach to convert equity book values of unlisted firms to market values involves the use of market capitalization ratios derived from similar listed companies, on a country-by-sector-of-activity basis. In concrete terms, for any given unlisted non-financial corporation, (1) we identity similar listed companies, (2) we calculate a market-to-book value ratio and (3) we multiply the company's equity book value by its corresponding ratio.

This market capitalization valuation is one of the three methods preferred by international organizations to provide estimates of market value (OECD, 2023). It has the advantage of taking into account both trends in the financial markets - the market capitalisation of listed companies - and trends in the actual financial situation of companies - equity. In previous experiments, the method often relied on capitalization ratios derived from as-broad-as-possible stock exchange indices and, consequently, remained limited to those companies used to build such indices. One obvious problem is that market indices may carry a construction bias and may not be fully representative of the country's economic structure.

In this paper, we free ourselves from some of the market indices' biases by using a larger dataset than ever experienced with. The ECB-maintained Centralised Securities DataBase (CSDB) is designed to contain all securities and listed shares issued by euro area and non-euro area EU residents in all currencies at the individual country level, as well as by residents of the rest of the world in euro. Albeit very "European-centred", this database serves our purpose since French foreign direct investment (FDI) is mainly resulting from European interactions. In this exercise, the CSDB provides us with a long list of listed non-financial corporations between 2012 and 2023, for which we can extract an ISIN code, a share price, an issuance country and the NACE sector of activity.

We can then match this dataset with a private data provider using the ISIN code of the company's share found in the CSDB to extract consolidated book values (*total equity*) and the corresponding market value for that same company (*market capitalization*).

Since financial private data providers may be charged with dubious quality (Landis and Skouras, 2021), we run robustness checks by extracting similar data from two different providers and compared them. We directly extract book-to-market ratios in US dollars from Thomson Reuters Datastream that we convert in euros. We then compare these ratios with the ones we build using Bloomberg data, where we extract both market and book values directly in euros. We voluntarily extract data that was not directly comparable and recalculate ratios to ensure robustness. This comparison is run for over 3 000 companies. The average correlation between ratios coming from the two different sources is greater than 0.95 (median is 0.98), convincing us that the data extracted is reliable.

Overall, our data is available from 2013 to 2023[2] (except otherwise). Since this exercise was initially part of a benchmark year revision, data starts in 2012. In total, we extract approximately 70 000 observations per year, for which we can observe both a market and a book value, across 241 geographical regions/countries/zones and 9 sectors of activity.

3. Descriptive statistics

Dealing with outliers

OFBV and market value estimates have to be consistent, in the sense that their ratios have to lie within a reasonable range. In our final working dataset, the average ratio historically stands around 1.98, i.e. on average a company's market value is about twice its book value, which is consistent with previous findings (see for example, Durant and Massaro, 2004).

However, the initial data extraction reveals a distribution skewed to the right, with extreme values. Table 1 gives an overview of the ratios' distribution over the whole period of observation for the initial dataset: the median ratio reaches 1.34, but the mean stands at 68.

Table1

Distribution of individual market capitalisation ratios

(2012-2023)

Statistics	Value
Minimum	0.00
1st percentile	0.00
5th percentile	0.16
1st decile	0.36
1st quartile	0.73
Median	1.34
3rd quartile	2.75
9th decile	5.76
95th percentile	9.86
99th percentile	41.17
Maximum	6 151 912.19

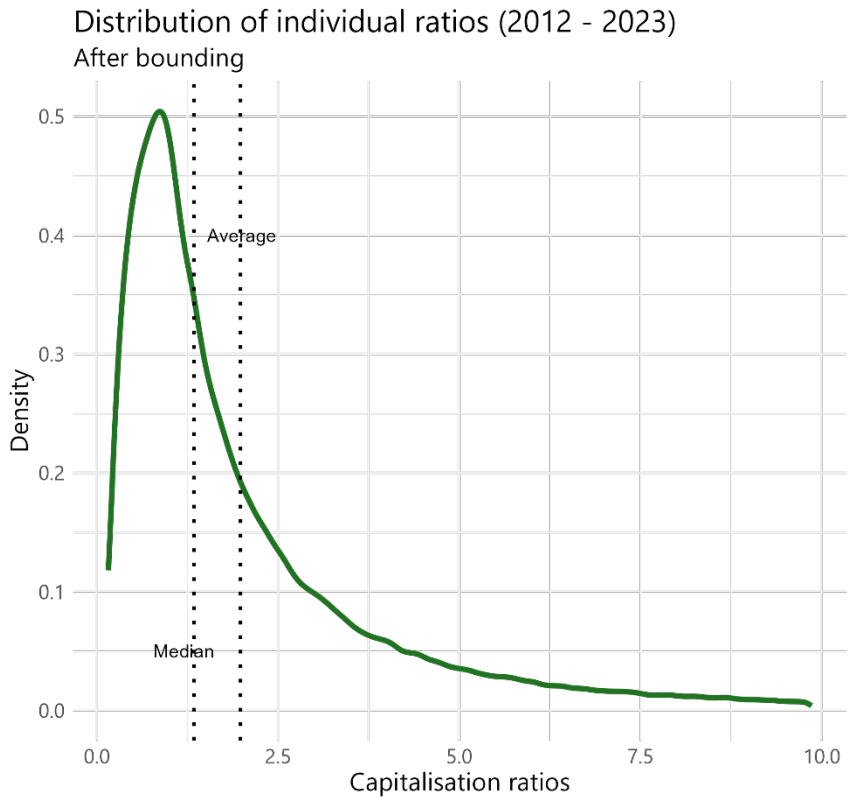
[2] Because the CSDB only provides listed companies starting in 2014, our dataset does not include those companies that left the stock exchange in 2012 and 2013, but only those who were still listed in 2014. The resulting selection bias, however, is expected to be limited as entry-and-exit in the stock exchange is fairly low: on average, individual ISIN codes lasts 7.4 years in the CSDB.

Source: CSDB and Bloomberg data – Banque de France.
Note: the median ratio is 1.34 over the whole period of study.

Table 1 suggests that not all ratios are representative. Indeed, multiplying the OFBV by either 0 or more than 6 million would lead to unreasonable statistics. This is an incentive to detect and remove outliers. In order to keep the shape of the ratios' distribution, we choose to apply symmetric bounds, contrary to Canada for instance where bounds are set to 0.5 and 10 (Canada, 2010). Since the 1st and 99th percentiles' trim still looks meaningless, we choose a 5th and 95th percentiles' trim. Doing so leads to a 10% cut in the data, which looks acceptable given the population size. However, because bounding might have a strong impact on statistics, we also run simulations using the 1st and 99th percentiles' bounds. Bounds have a very low impact: in average over the period, the relative difference over results between both sets of bounds is lower than 1%.

Using 5th and 95th percentiles leads to relatively stable bounds over the years (respective ranges are [0.14; 0.21] to [8.31; 12.10]). Ratios' standard deviation falls from 79.70 without bounds to 0.83 with 5th – 95th percentiles' bounds (1.50 with 1st – 99th percentiles' bounds). Figure 1 provides the distribution ratios after trimming.

Figure 1



Sources : CSDB and Bloomberg data - Banque de France
Note: median and average ratios (1.34 and 1.98) are arepresented by dotted lines.

One may suggest that trimming on absolute values may not guarantee consistent results through time. Indeed, we could also bound ratios by their yearly

variations. After bounding absolute ratios, the range of yearly variations' remains large (from -1 to more than 10). However, after grouping ratios by geographical zones and sectors of activity as we will detail below, yearly variations range from -0.49 to 0.94, which seemed reasonable.

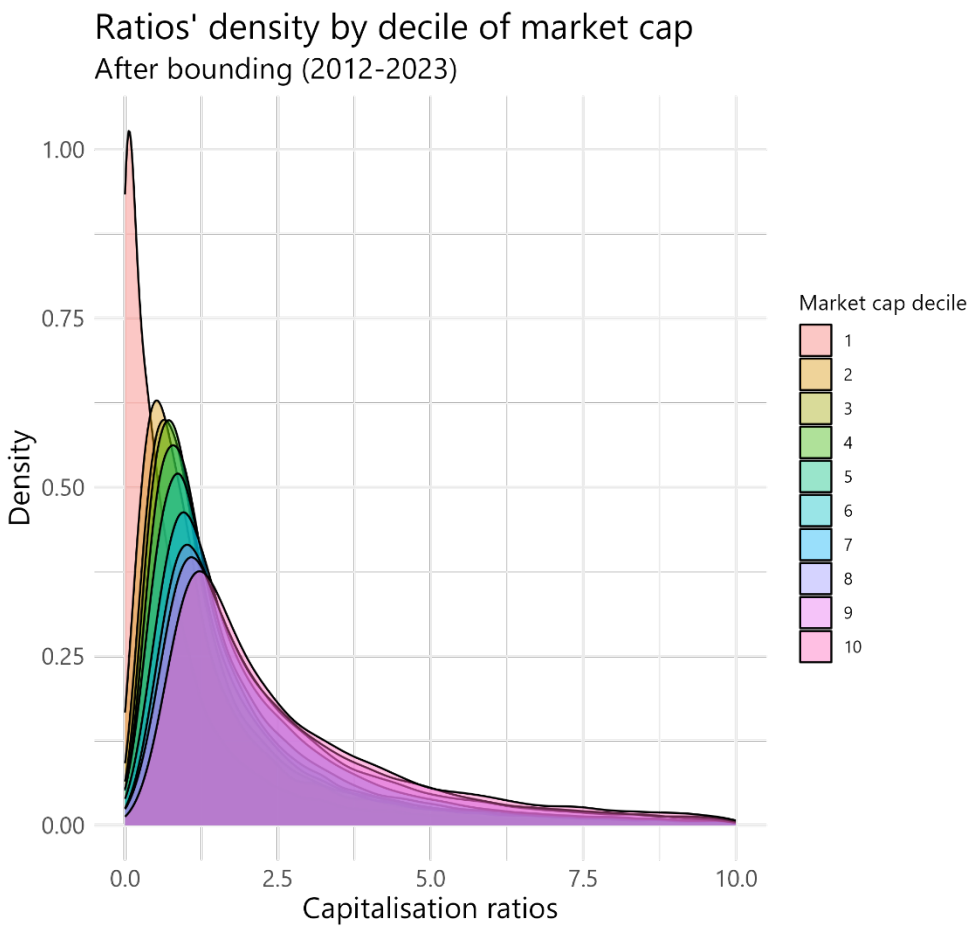
Having calculated our individual market capitalisation ratios, we could now pair every unlisted direct investment enterprise (DIE) with listed companies of the same geographical zone and sector of activity using either a median or an average ratio.

Median or mean? Does it have to do with illiquidity discount?

Usually, using the median instead of the mean ensures robustness as the median is less sensitive to extreme values. Since we already apply bounds to filter out outliers, using the median rather than the mean may be relevant for an additional reason.

Skewness to the right is conspicuous in our data, meaning that higher values strongly pushed the mean upwards. Because large caps tend to have higher ratios than mid to small ones (Figure 2), using the mean rather than the median simply leads to an over-representation of large caps.

Figure 2



Sources : CSDB and Bloomberg data - Banque de France
Note: higher deciles of market cap match with large caps

Note that the entry-and-exit rate between market capitalization deciles, defined as the standard deviation of inter-deciles' changes is 0.55 over the whole period of observation. In other words, population within a decile remains relatively stable from one year to the next and in seven years, about half of companies had remained in the same decile.

Not only large caps remain large caps and small caps remain small caps, but larger caps also tend to have higher capitalization ratios (Table 2).

Table 2

Distribution of individual market capitalisation ratios (2012-2023; trimmed dataset)

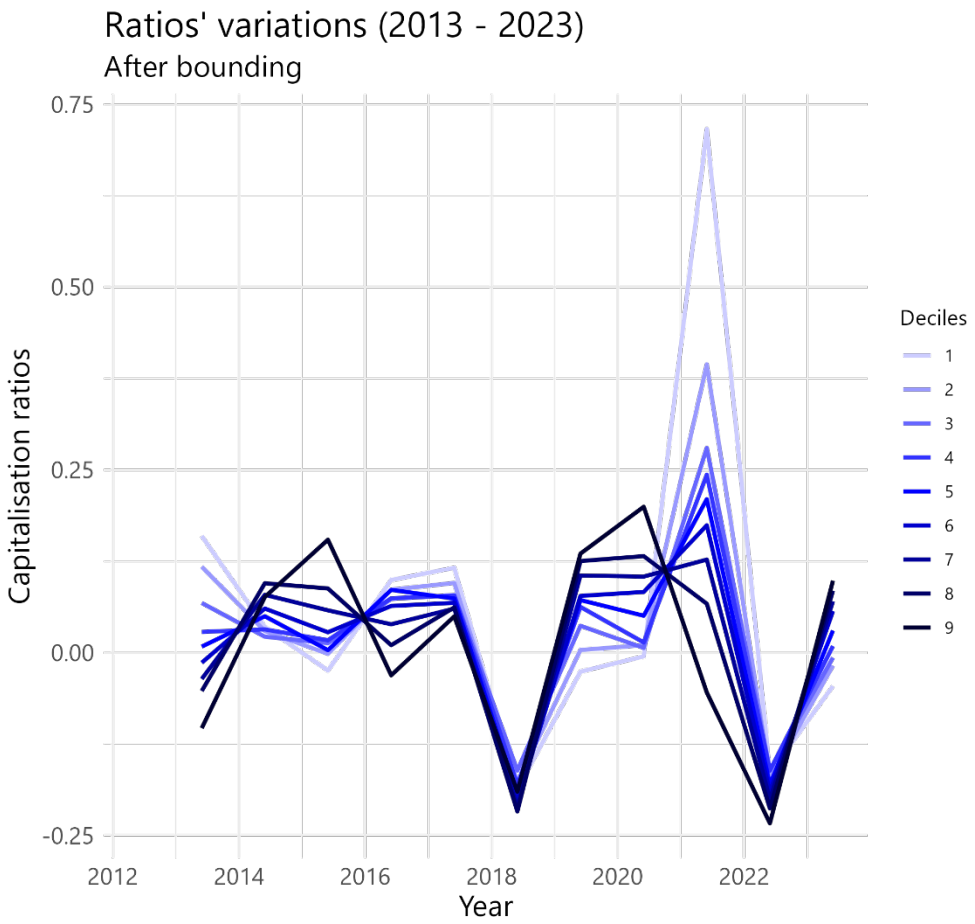
	Small caps *i.e. three first deciles of market cap distribution*	Large caps *i.e. three last deciles of market cap distribution*
Average market cap percentile	*15*	*85*
Average OFBV percentile	24	87
Average ratio percentile	41	69

Source: CSDB and Bloomberg data – Banque de France.
Note: on average, large caps have higher OFBV.

Indeed, let us assume small caps are represented by the first three deciles of the market cap distribution (as in Figure 2) and large caps are represented by the last three deciles. This would mean that large caps market capitalization ratios would stand, on average, at the 85th percentile, fairly close to where their book value would stand in their own distribution (see Table 2) In other words, large caps' book value is overall very consistent with their market value. So is also the case for smaller caps, but slightly less so.

Figure 3 presents capitalization ratios year-on-year variation depending the position in capitalization deciles in the previous year. The darker the colour of the line, the larger the firm's market capitalization. Over the observation period, market capitalization ratios moves differently depending on whether they tend to be high or low.

Figure 3



Sources: CSDB and Bloomberg data - Banque de France
Note: smaller and higher ratios might evolve differently.

Because small caps tend to have lower capitalization ratios, using the median instead of the mean also means better representing variations. Even if the companies for which we estimate a market value are part of multinational groups, they remain unlisted and may not be well represented by large caps. Listed firms' shares are indeed obviously more tradable than unlisted equity and in this respect, size also matters.

In Durant and Massaro (2004), this lack of representativeness was dealt with by using the mean coupled with an illiquidity discount applied to all capitalization ratios when ascribed to unlisted firms. For France, the discount was estimated to amount to 25% (Picart, 2003). In this paper, we do not consider applying such a discount for two reasons. First, the illiquidity discount needs to be (re)estimated and broken down by country and sector of activity. More importantly, large caps, which tend to be more liquid, are over-represented in our dataset when using mean ratios. Since the median better represents small to mid-caps, we are not sure of how relevant an illiquidity discount is. Indeed, one may think that the liquidity of an unlisted direct investment firm is closer to that of a listed small or mid-cap one.

Hence, we pair every unlisted direct investment enterprise with the median ratio of listed companies of the same geographical zone and sector of activity.

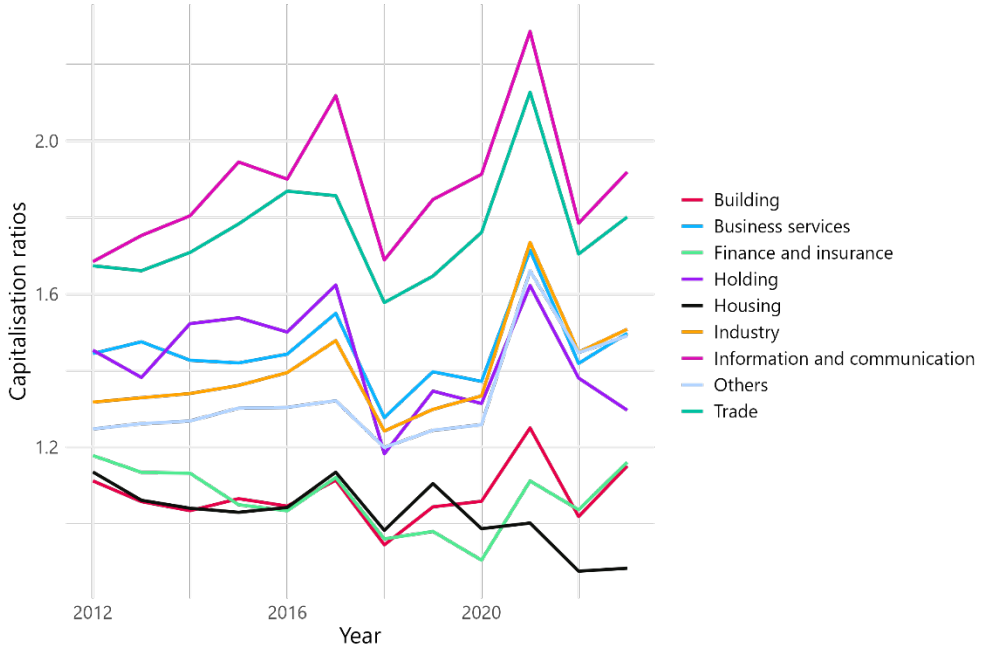
Differentiating the data by sectors and geographical location

As mentioned by Statistics Canada (2010) and confirmed by Figure 4, capitalization ratios vary across sectors of activity. For example, capitalization ratios in the financial sector appear very low, often below 1. Contrary to non-financial corporations, and in the wake of the great financial crisis, financial firms have been subject to tighter prudential rules. Capital requirements to meet regulatory solvency ratios may explain why market capitalization ratios have been decreasing in the financial sector. Inversely, IT and communication firms tend to have high market capitalization ratios, as they are known to hold substantial intangible assets, and may be seen as bearing good prospects, high revenues expectations following an innovative stream. Yet it comes as no surprise that the 2018 dive was larger for the IT and communication sector since tech firms, at the time, went into particular scrutiny for fear of market overvaluation. Financial bubbles and asset price volatility may indeed have a significant impact on market capitalization ratios, as share prices are much more volatile than book values.

Figure 4

Average of final ratios by activity sector

Field: median ratios (from geo-zone-by-sectors' samples, after bounding), 2012-2023

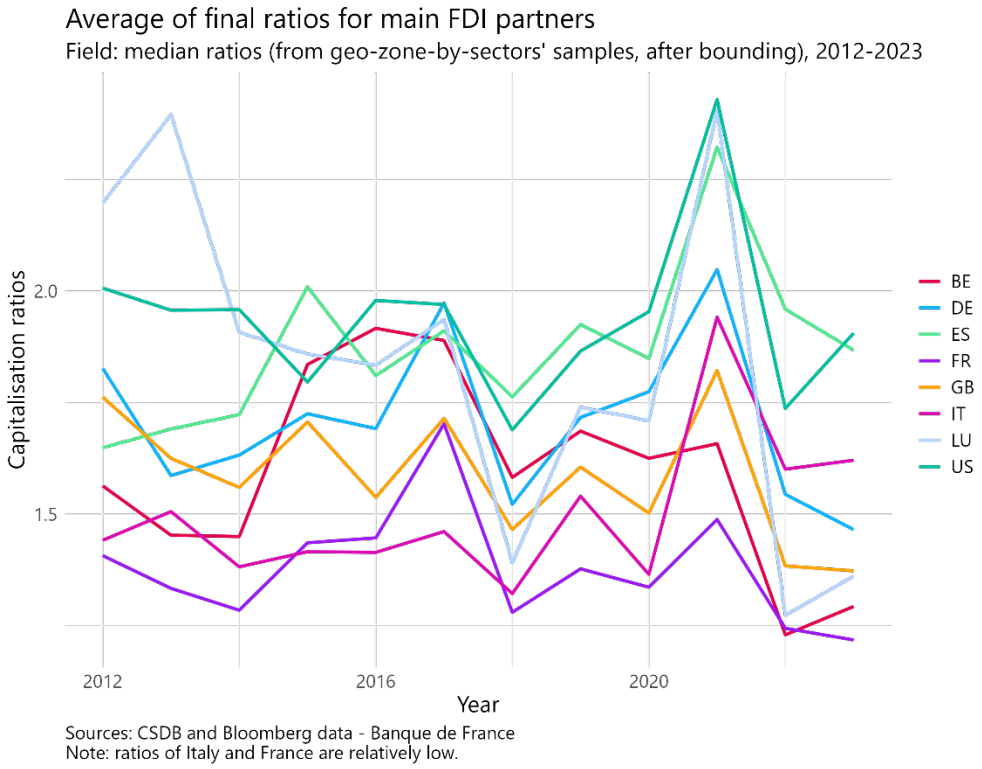


Sources: CSDB and Bloomberg data - Banque de France
Note: trade companies' ratios are higher than for holdings.

Capitalization ratios appear to vary substantially across geographical regions. Among the main FDI partners for France, the Netherlands, Spain and the US were the top three higher ratios' countries in 2023 (Figure 5). One may wonder if a higher ratio can be linked to some greater attractiveness of the US stock market or of certain regional markets, possibly in the same way some sovereigns have been considered safe havens (Gourinchas and Rey, 2016). Debt levels also matter significantly: the relatively low level of French ratios compared with other countries may be explained by the reportedly higher debt of French non-financial corporations: nearly 80% of

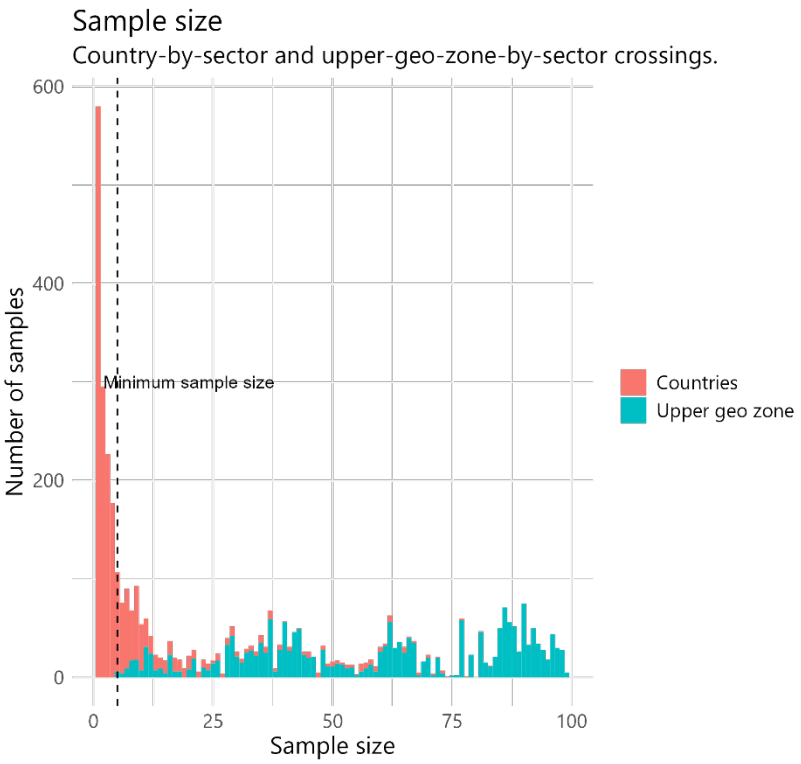
GDP in 2023 compared with less than 60% in most other euro area countries and less than 50% in the US (Banque de France, 2023).

Figure 5



Not all country-by-sector-of-activity cross-tabs are large enough to be considered representative samples. Because sectors might be more discriminating than the country dimension, we suggest grossing up to the upper-level geographical aggregation for smaller samples. By doing so, the minimum direct investment firms' sample size reaches 5 (Figure 6).

Figure 6



Sources: CSDB and Bloomberg data - Banque de France
Note: to facilitate readibility, samples of size lower than 100 are represented

We then apply the following rule: every DIE is paired within the country-by-sector-of-activity sample if the sample size is greater than 5. If not, we consider the upper-level-geographical-zone-by-sector sample (then called geo-by-sector sample). Because every DIE has unique characteristics that potentially determine individual capitalization ratios, we then apply the median ratio of the geo-by-sector sample, to the OFBV. In other words, should an unlisted DIE in industry located in Paraguay cannot find its match, we use the corresponding median ratio for industry at the Latin America level.

4. Market valuation methodologies for stocks

Table 3

Notations

Indices & statistics	*BoP quantities*	*Others*
$\boldsymbol{n}$ year	$\boldsymbol{U}$ OFVB stock	$\boldsymbol{p}$ price index
$\boldsymbol{i}$ DIE	$\boldsymbol{V}$ market stock	$\boldsymbol{s}$ in-and-out threshold for price index
$\boldsymbol{j}$ sector	$\boldsymbol{R}$ capitalisation ratio	$\boldsymbol{ls}$ listed share
$\boldsymbol{k}$ geographical zone	$\boldsymbol{F}$ flow	$\boldsymbol{us}$ unlisted share
$\bar{\boldsymbol{x}}$ mean	$\boldsymbol{K7A}$ exchange rate effect	$\boldsymbol{\tau}$ change rate
$\tilde{\boldsymbol{x}}$ median	$\boldsymbol{K7B}$ market effect	
$\boldsymbol{a}$ after	$\boldsymbol{OC}$ other changes	
$\boldsymbol{b}$ before	$\boldsymbol{re}$ reinvested earnings per share	
	$\boldsymbol{S}$ ownership share	

Source: Banque de France.

Note: the median ratio is 1.34 over the whole period of study.

Method 1: using price indices

The US were the first country to publish a market valuation model (Eisner and Pieper, 1990). It basically consists in adjusting the value of FDI stocks to reflect their current market valuation.

$$V^{us}_{1,j,k,n} = R_{1,k,n} * U_{1,n} \quad (1)$$

$$V^{us}_{i,j,k,n} = V^{us}_{i,j,k,n-1}\left({}^{p_n}/_{p_{n-1}}\right) + \left(F_{i,j,k,n} - re_{i,j,k,n}\right)\left({}^{p_n}/_{\bar{p}}\right)$$

For the base year, market value is either assumed to be equal to book value or is estimated with market capitalisation ratios (1). For subsequent years, market values are simply updated along changes of a price index, i.e. the price of traded shares as indicated by stock market transactions (2). The equation is adjusted of retained earnings per share (that is $RE_{i,j,k,n}/V^{us}_{i,j,k,n}$) to avoid double counting[3]. Factorising by $V^{us}_{i,j,k,n}$ leads to the equation later published by Kozlow (2002) and still in use today in the US valuation methodology.

$$V^{us}_{i,j,k,n} = \frac{V^{us}_{i,j,k,n-1}\left({}^{p_n}/_{p_{n-1}}\right) + F_{i,j,k,n}\left({}^{p_n}/_{\bar{p}}\right)}{1 + re_{i,j,k,n}\left({}^{p_n}/_{\bar{p}}\right)} \quad (2)$$

[3] A stock market price index will tend to rise simply due to reinvestment of earnings by companies included in the index.

The US rely on various stock price indices. An obvious caveat of this method is that most listed companies are not part of a stock price index. For instance, in France, only 250 companies form the largest stock price index (the so-called SBF-250), while there are more than 1 000 listed companies overall in France. In other words, SBF-250 only roughly matches with the highest deciles of French listed companies in terms of market cap. More generally, even when stocks are weighted by their market capitalisation, large caps are always those companies making up stock indices (ex: MSCI World).

A way to sum up the building of a market price index could be threshold defining entry-exit movements, such as:

$$p_n = \sum \{V_{j,k,n}^{ls} > s_n\}$$

In other words, entry and exit movements in the stock price index can be described by decreasing capitalizations at the bottom of the list exiting the index, being replaced by increasing ones. This is a selection bias we intent to overcome by building nearly exhaustive price indices, without any threshold, from the CSDB and private data providers.

$$p_n = \sum V_{j,k,n}^{ls}$$

Doing so allows to use exactly the same geo-zone-by-sector samples whatever the valuation method used.

Another caveat of the price index methodology is that it eventually overstates FDI stocks since write-offs of existing capital are not taken into account.

Finally, Kozlow (2002) describes the method as using US price indexes and offsetting local market evolutions with that of exchange rates (local currency vs US dollar[4]). This hinges on a critical assumption that may need to be qualified: aggregate share price indices, reflecting mostly stocks of domestic companies, must offer a reasonable measure of the values of the companies in which the US have made direct investment abroad. Since we use data from all over the world, market caps already reflect local market conditions but this remains an issue to consider.

Method 2: by capitalisation ratios

The valuation method by market capitalization ratios has been gaining traction and is a measure that is not based on an accrual basis.

In concrete terms, for any given unlisted (us) DIE (i), after identifying similar listed companies (ls) – same activity sector (j) and geo zone (k), we calculate a market-to-book value ratio such as:

[4] More precisely, evolutions of the price index applied are $p_n\tau_{n-1}/\tau_n p_{n-1}$ and $p_n\bar{\tau}/\bar{p}\tau_n$

$$R_{j,k,n} = \widehat{V_{j,k,n}^{ls} / U_{j,k,n}^{ls}}$$

As explained previously, we consider the median ratio of market (V) to book (U) values. We then multiply the company's equity book value by its corresponding ratio:

$$V_{i,j,k,n}^{us} = R_{j,k,n} * U_{i,n}$$

We do this over time (n years) so that the estimate of the market value is both linked to its book value and the evolution of price to book ratios.

Home or host market capitalization ?

At this point, another relevant issue arises when choosing the right market capitalization measure to calculate $\boldsymbol{R}$. FDI is meant to create long-lasting links between economies and are reportedly much more stable capital flows than portfolios or other investment flows. Yet, FDI flows may also reflect arbitrage activity by multinationals due to some mispricing in international capital markets (Shleifer and Vishny, 2003 or Baher, Foley and Wurgler, 2009). In that case, FDI flows either reflect the opportunistic use of a relatively low financial capital available to overvalued home country firms, or inversely, the acquisition of relatively undervalued host country assets. Most likely, the DIE value is linked to both home and host capital markets. So far, we have considered that the DIE value only depends on the host stock exchange. But it might well be that developments at home also matters: the DIE value of a large US tech company may well be closer to similar US entities than to other tech companies of the same country, - whether in terms of levels or changes.

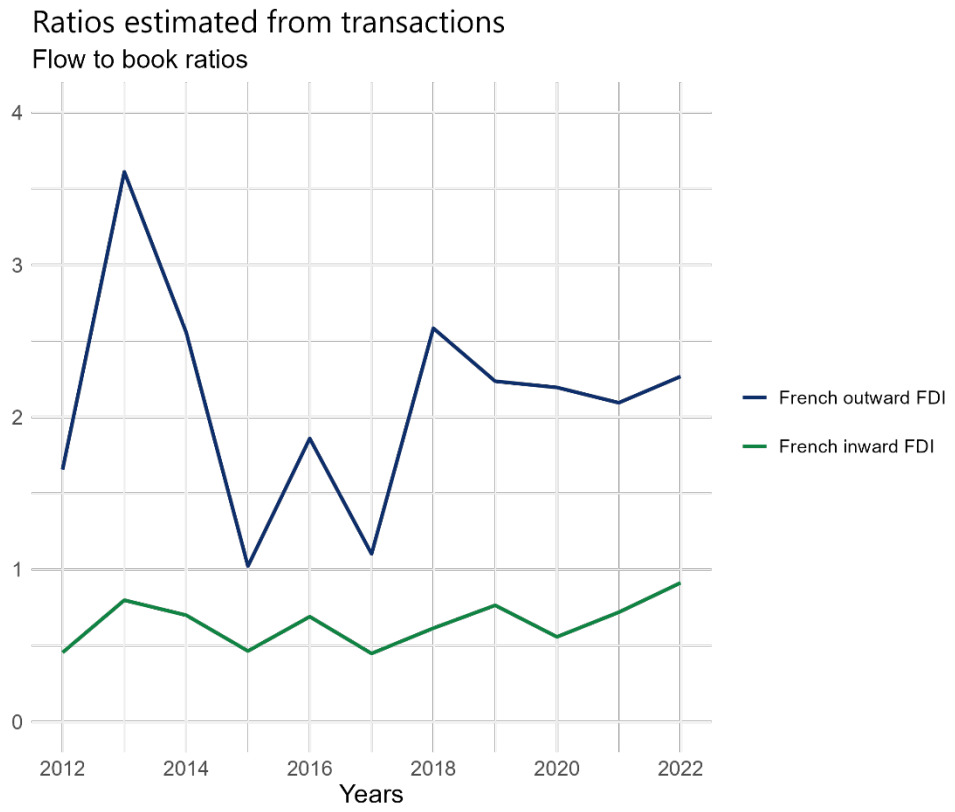
Against this background, using local-based capitalization ratios may misrepresents the true link between the DIE and its parents.

Based on our French FDI data, we can observe "true" capitalization ratios by calculating ratios based on market values directly derived from reported transactions. We calculate transaction-based market value as follows:

$$V_{i,j,k,n}^{us} = \frac{F}{S_a - S_b}$$

Where $\boldsymbol{V}$ is the total market value of the DIE, $\boldsymbol{F}$ the amount paid by the parent company, $\boldsymbol{S_a}$, the ownership share after the transaction and $\boldsymbol{S_b}$, the ownership share before the transaction. Clearly we can only do it for a small subset of data, but the result is striking (Figure 10). Capitalization ratios for outward FDI are close to 2 over the whole period, but capitalization ratios for inward French FDI are lower than 1. This is in line with average capitalizations ratios being lower in France than in other countries, and would endorse the fact that using host capitalization ratios is more in line with actual observations.

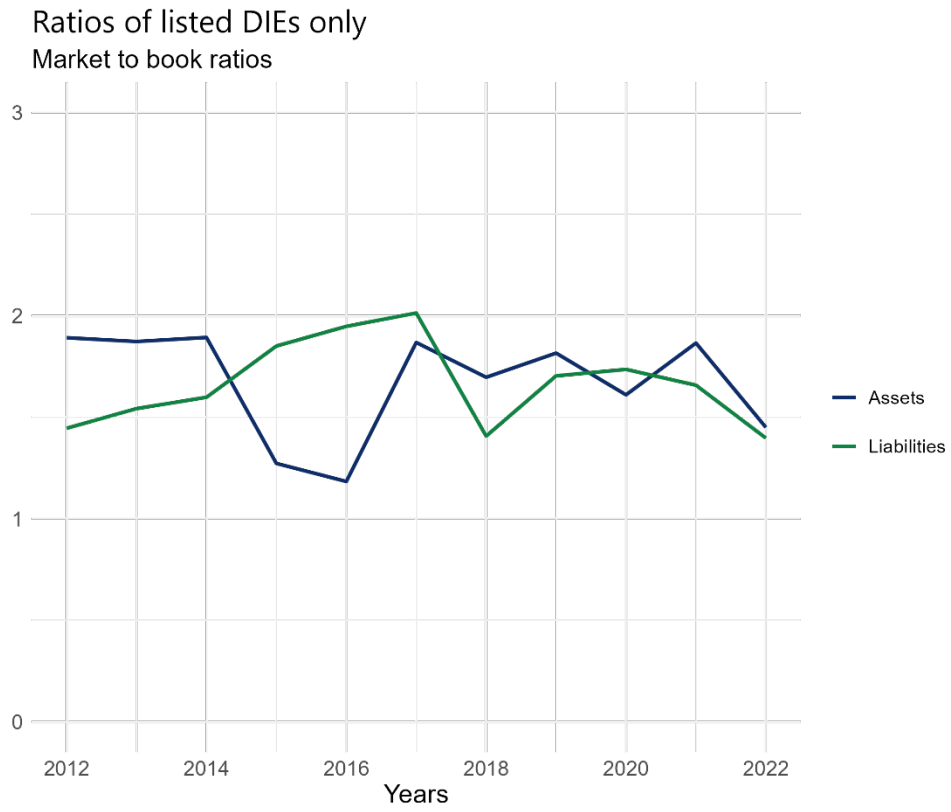
Figure 7



Source: Banque de France
Note: samples' size are 177 outward and 250 inward transactions on a yearly average basis.

However, another way to test this hypothesis is to compare home and host-based market ratios of listed DIEs. Figure 11 computes listed firms median capitalization ratios for assets (host) and liabilities (home) and shows no significant difference in levels calling for a use of both host and home-based capitalization ratios.

Figure 8



Sources: Banque de France, CSDB
Note: samples' size are 64 for assets and 176 for liabilities on a yearly average basis.

As a simplifying rule, we suggest to equally take into account home and host stock markets by defining the market values' estimate' as follows:

$$V_{i,j,k,n}^{us} = (0{,}5 * R_{j,k,n} + 0{,}5 * R_{France,k,n}) * U_{i,n}$$

Applying perfectly symmetric capitalizations ratios, regardless of the FDI direction (inward or outward), allows to focus on the country-to-country economic relationship rather than on the investor/investee relationship.

Simulations comparing all-host, all-home and our "trade-off" capitalization ratios are in Appendix(see Figures 12, 13 and 14).

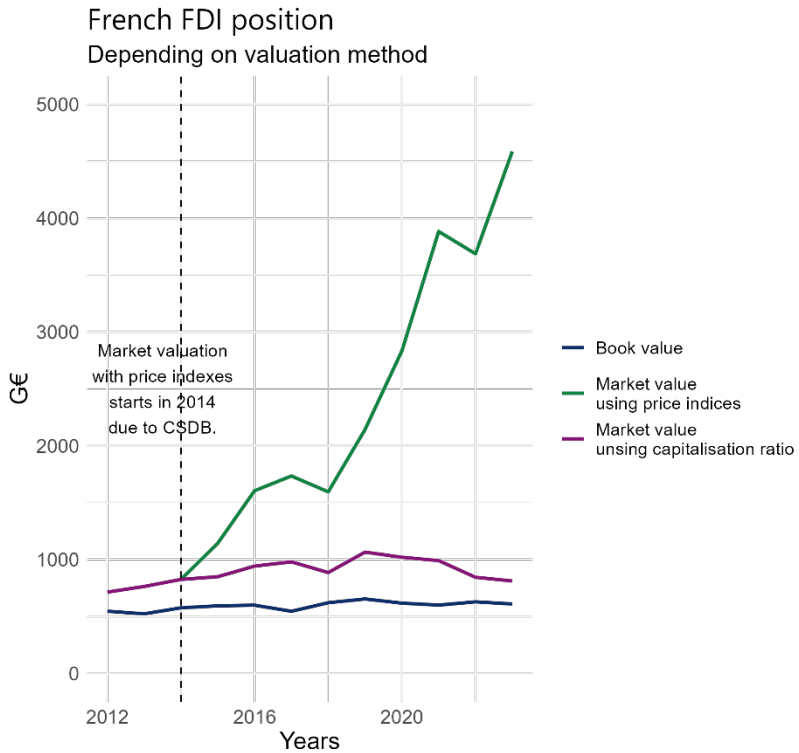
5. Simulations

Aggregated results

Even if we built very encompassing price indices, the larger the market capitalisation, the bigger the weight in that index. As a result, index price variations tend to represent large caps more than any other firms and are actually the same as average year-on-year variations. As expected, both market valuation methods lead to assets and liabilities that are significantly larger than book values (see Figures 10 and 11 in Appendix).

As a result (see Figure 9), the French net FDI external position would have shown an increase that OFBV values do not follow: between 2014 and 2023, the positive external position would have increased from 610 G€ to 4,586 G€ with the price index valuation method and to 812 G€ with the market capitalization ratios method.

Figure 9



Sources: CSDB and Bloomberg data - Banque de France
Note: both market valuation methods lead to greater numbers.

As shown in Figure 9, the trend is quite different depending on the method used. From year two, the price index valuation model mostly relies on market capitalization year-on-year variations, with, by construction, large caps contributing more than small caps. In equation (2), the price index' growth is meant to be partially offset by retained earnings per share. Yet, on average, retained earnings per share was about 3% in our data. In other words, the averaged denominator is 1.03, which might not be enough to compensate for the price index' growth.

We have not applied any liquidity premium in this model, given we were relying on medians. However, in this case, large successful capitalizations drive year-on-year variations in the price index valuation method from year two. Hence we tend to believe a liquidity premium probably needs to be taken into account for this method to be relevant. At this stage, our preferred method would clearly be on the market capitalization ratios.

6. Flow-stocks reconciliation

To our knowledge, countries that estimate a market value for unlisted DIEs in the BoP actually publish both book and market values, but do not necessarily communicate on flow and stock reconciliation.

Should the flow-stock reconciliation be carried out on OFBV values, there would be no valuation effect linked to the value of shares on the stock exchange, so that only an exchange rate effect (K7A) and other changes in volume (OC) would appear in the flow-stock reconciliation equation:

$$U_n = U_{n-1} + F + K7A_n^U + OC^U$$

The question arises on how to reconcile flows and stocks when dealing with market values and several models could be considered. Because our preferred method is that of market capitalisation ratios, we derive the flow-stock reconciliation from that specific model.

Whereas there is no stock market valuation effects when using OFBV, they (K7B) naturally appear when considering listed firms:

$$V_n = V_{n-1} + F + K7A_n^V + K7B_n + OC^V$$

We observe transactions (flows) at their market value, at the time of the transaction. Exchange rate effects are defined as the variation in exchange rate from one end-of-period to the next end-of-period, modifying the value of the stock. While we had the following exchange rate effect when considering OFBV:

$$K7A_n^U = \frac{\tau_n - \tau_{n-1}}{\tau_{n-1}} * U_{i,n-1}$$

It can be written as follows using market values:

$$K7A_n^V = \frac{\tau_n - \tau_{n-1}}{\tau_{n-1}} * V_{i,n-1}$$

When moving from OFBV to market value, exchange rate effects soak up a small part of the difference in stocks' values, but most of the difference between book and market values will be explained by market valuation effect and other changes in volume. The question is how to clearly differentiate between these two effects. On

the following models, we will assume market valuation effects are only due to stock price variations.

The F511 model[5]

When reconciling stocks with flows for listed equity alone, the definition of stock market valuation effects can be written as :

$$K7B_n = \frac{R_{j,k,n} - R_{j,k,n-1}}{R_{j,k,n-1}} V_{n-1} = (R_{j,k,n} - R_{j,k,n-1}) U_{n-1}$$

In such a case, other changes in volumes may be seen as a residual and serve as an adjustment variable:

$$OC^V = V_n - (V_{n-1} + F + \frac{\tau_n - \tau_{n-1}}{\tau_{n-1}} V_{n-1} + K7B_n)$$

The all-valuation effect model

Yet, the Balance of Payments manual and the OECD Benchmark definition for foreign direct investment suggest that each component of the stock-flow reconciliation has economic meaning. Other changes in volume in particular are defined as "*any changes in the asset value that are due neither to transactions nor to revaluation. These changes include those due to cancellation and write-offs, economic appearance and disappearance of assets, reclassification, and the changes in financial assets arising from entities changing their economy of residence*". From this definition, there is no reason why the stock valuation method should modify the value of other changes in volumes, so that:

$$OC^V = OC^U$$

In such a case, valuation effects should really be seen as the adjustment variable:

$$K7B_n = V_n - (V_{n-1} + F + \frac{\tau_n - \tau_{n-1}}{\tau_{n-1}} V_{n-1} + OC^U)$$

The hybrid split model

To better illustrate our conundrum, let us take the following example: say an DIE asset is worth 100 according to its OFBV value at the end of year 0. It is associated with a market capitalisation ratio of 2, constant through time. During the year, the parent company decides to recapitalize it asset and provides 10 as a yearly equity flow.

At the end of year 1, OFBV value reaches 110. At market value, the initial stock (200) is now 220. Yet the recorded flow is only 10. What shall we make of the additional 10? Since the market capitalization ratio remained constant (at 2), one

[5] According to the coding structure of Balance of Payments series, F512 relate to unlisted equity and F511 to listed equity.

could argue that there is no reason for valuation effect to be affected by this residual and that it should be assigned to other changes in volume.

More generally, in equations:

$$OC^V = R_{j,k,n}\, OC^U + \left(\frac{R_{j,k,n} + R_{j,k,n-1}}{2} - 1\right) F$$

$$K7B_n = V_n - (V_{n-1} + F + \frac{\tau_n - \tau_{n-1}}{\tau_{n-1}} V_{n-1} + OC^V)$$

In all three flow-stock reconciliation models, the exact same amount is distributed between valuation effects and other changes in volume. Depending on the model, variations in one component will be mirrored by variations in the other. The F511 model leads to more volatile series of market valuation and other changes in volume than the two other models (see Figures 15 and 16 in Appendix)

7. Conclusion

According to best methodological standards, FDI equity transactions and positions should correspond to their market value. Because most of FDI equity is actually unlisted, Balance of Payments compilers need to find a proxy to the value of the equity in case of unlisted equity.

Current methodological standards recommend a list of methods to approximate the market value with different levels of practical implementation. While none of the current manuals clearly indicates which method is preferred, discussions have been growing against the background of manuals revisions. We took this opportunity to revisit the market capitalization method using a large dataset of listed equity in order to test to which extent a full country-by-sector-of-activity dataset could be implemented for Balance of Payments purposes.

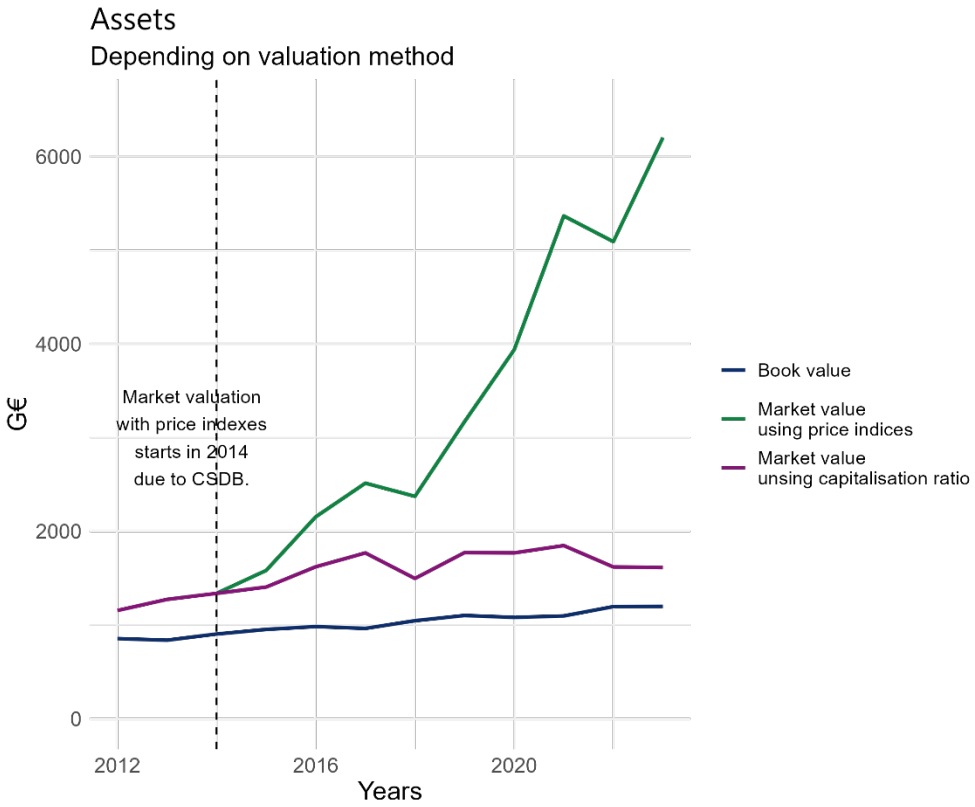
Our experiment raised some methodological issues that we discussed in this note: whether to choose an accrual method or not, how to take into account the economic links between home and host investment country and on how to reconcile flows and stocks from one period to the next. Some other technical aspects are only touched upon and would need further research. As we initially disregard the liquidity premium that was indirectly present due to the overrepresentation of large caps in our data, we realised it may be useful when using price indices to update market capitalization ratios on an accrual basis. This call for additional research on the liquidity premium and how it varies depending on countries and sector of activity. Also a careful treatment of firms' entry-and-exit into various categories of DIEs should certainly be implemented. Finally, since there is no negative market values, and because market capitalization ratios are always positive, the issue of negative equity, which may, in some countries, be legally accepted during a certain period of time, may have to be reconsidered.

As intense theoretical discussions are taking place with the forthcoming revision of international manuals, the issue of market valuation spills over some technical aspects dear to the heart of BoP compilers.

Appendix

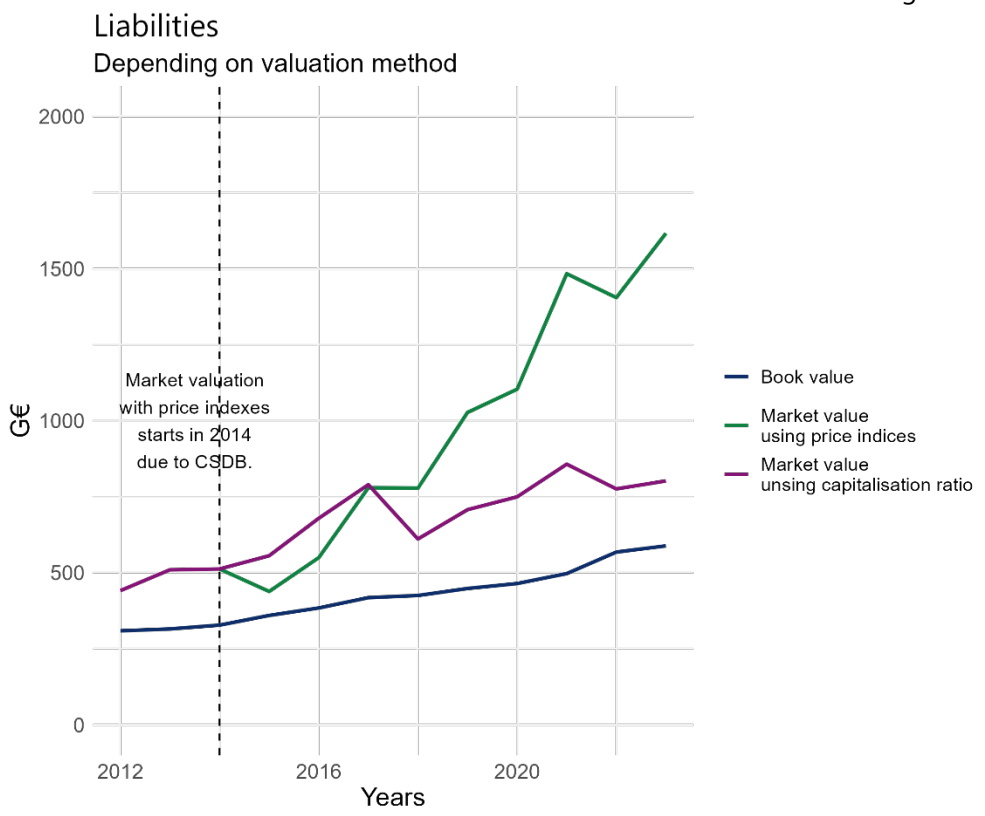
Methods comparison: price index vs ratios

Figure 10



Sources: CSDB and Bloomberg data - Banque de France
Note: both market valuation methods lead to greater numbers.

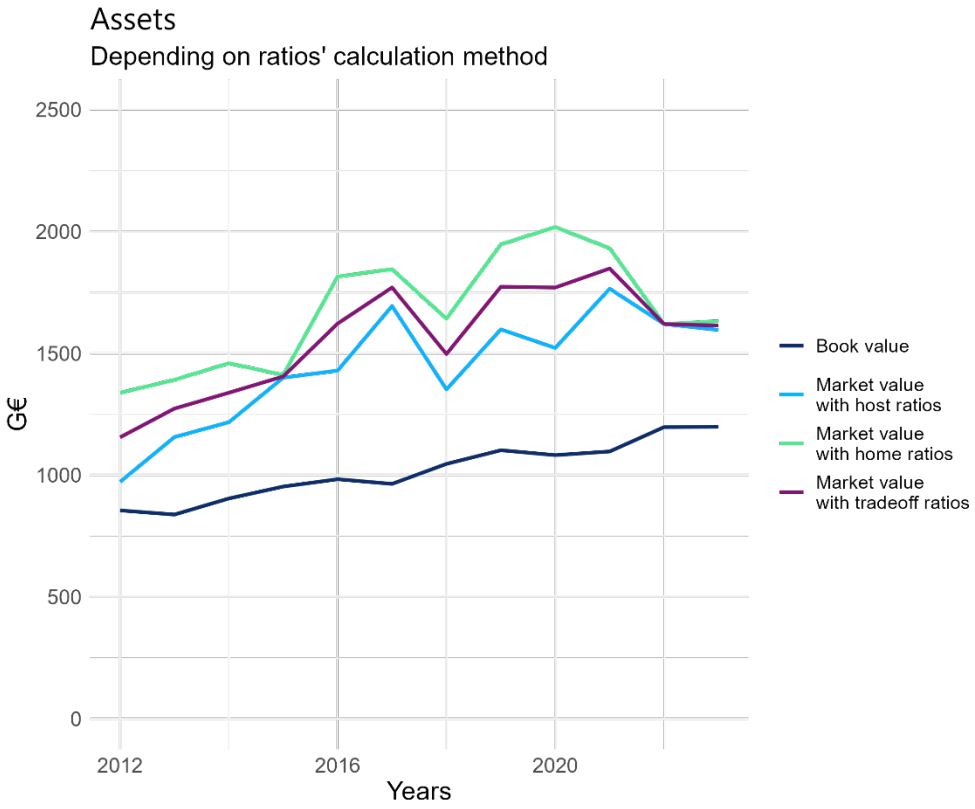
Figure 11



Sources: CSDB and Bloomberg data - Banque de France
Note: both market valuation methods lead to greater numbers.

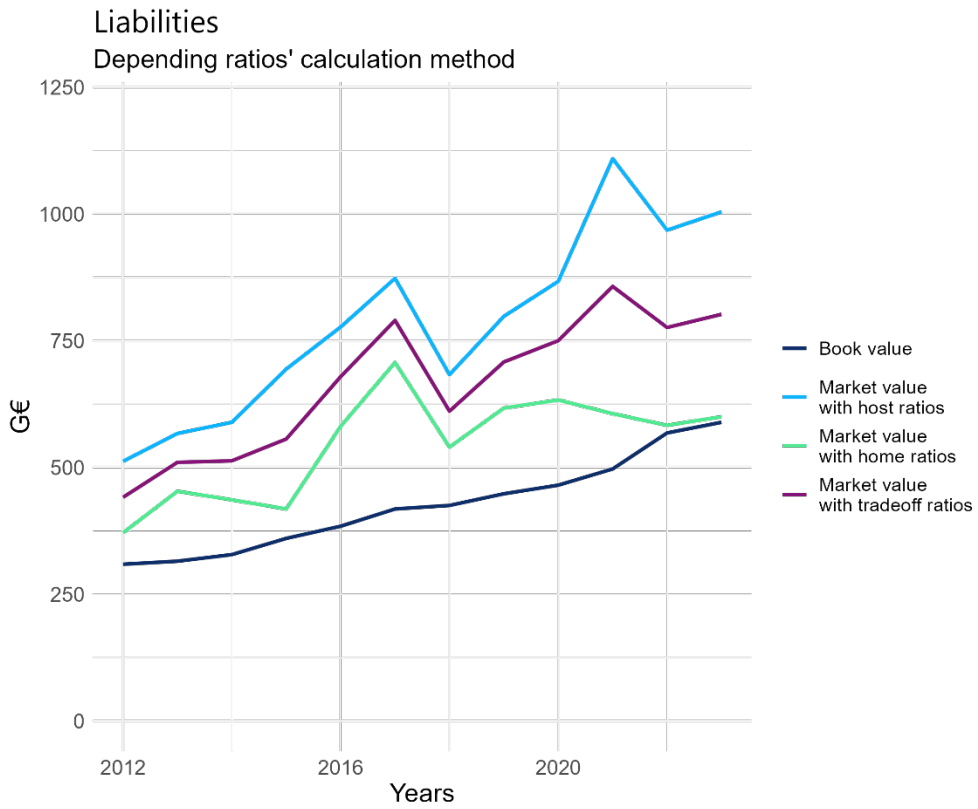
Home vs host capitalization ratios

Figure 12



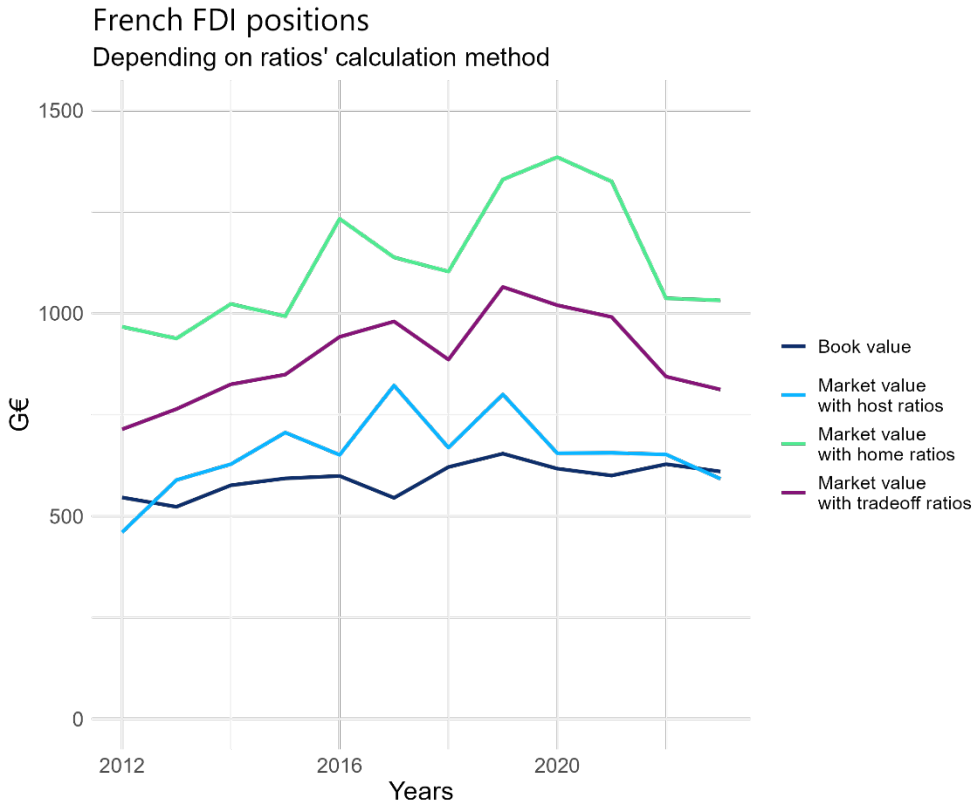
Sources: CSDB and Bloomberg data - Banque de France
Note: since French ratios are lower, using host ratios leads to a greater assets' position.

Figure 13



Sources: CSDB and Bloomberg data - Banque de France
Note: since French ratios are lower, using home ratios leads to a greater liabilities' position.

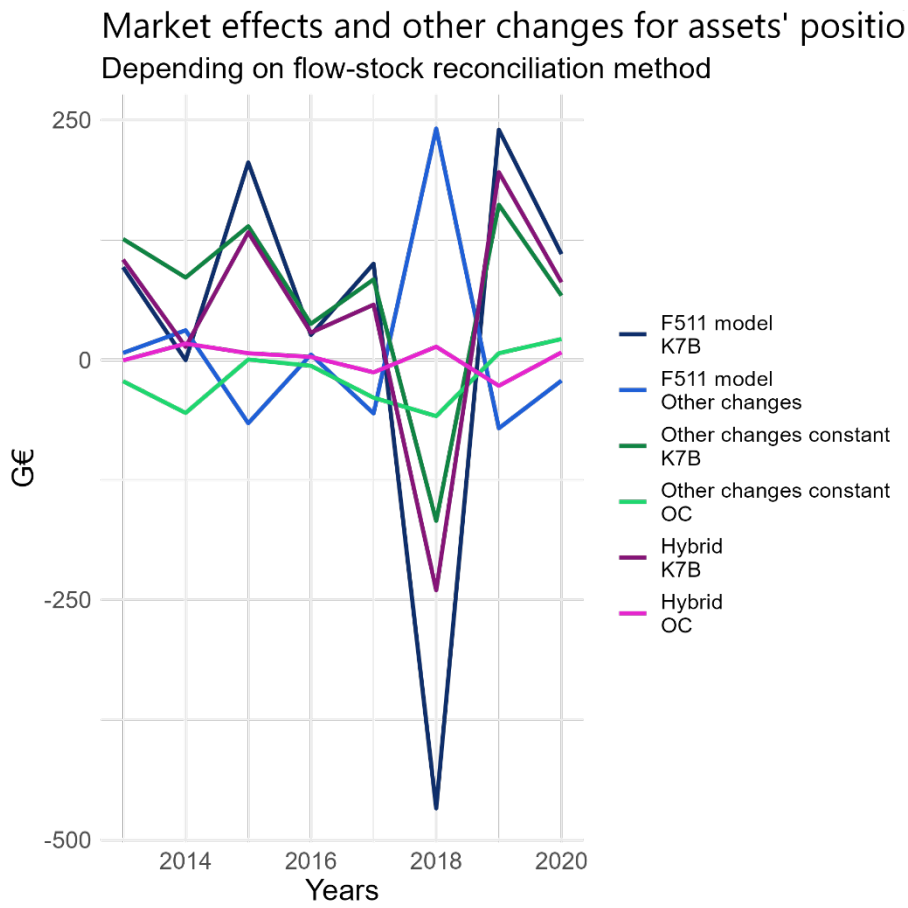
Figure 14



Sources: CSDB and Bloomberg data - Banque de France
Note: French FDI position would be greater using home ratios.

Flow-stock reconciliation

Figure 15

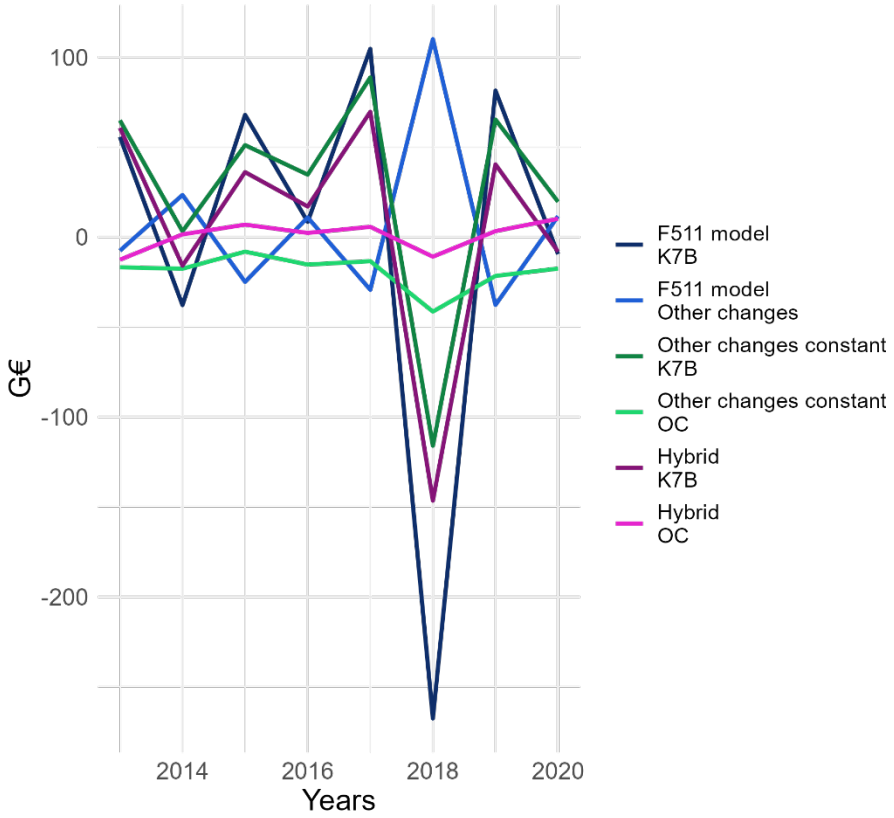


Sources: CSDB and Bloomberg data - Banque de France
Note: market effects and other changes compensate each other, whatever the methoc

Figure 16

Market effects and other changes for liabilities' position

Depending on flow-stock reconciliation method



Sources: CSDB and Bloomberg data - Banque de France

Note: market effects and other changes compensate each other, whatever the methoc

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MARKET VALUATION OF UNLISTED SHARES: AN EXPERIMENTAL EXERCISE

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BALANCE OF PAYMENTS DIRECTION

IFC, MADRID – 13/02/2023

BANQUE DE FRANCE
EUROSYSTÈME

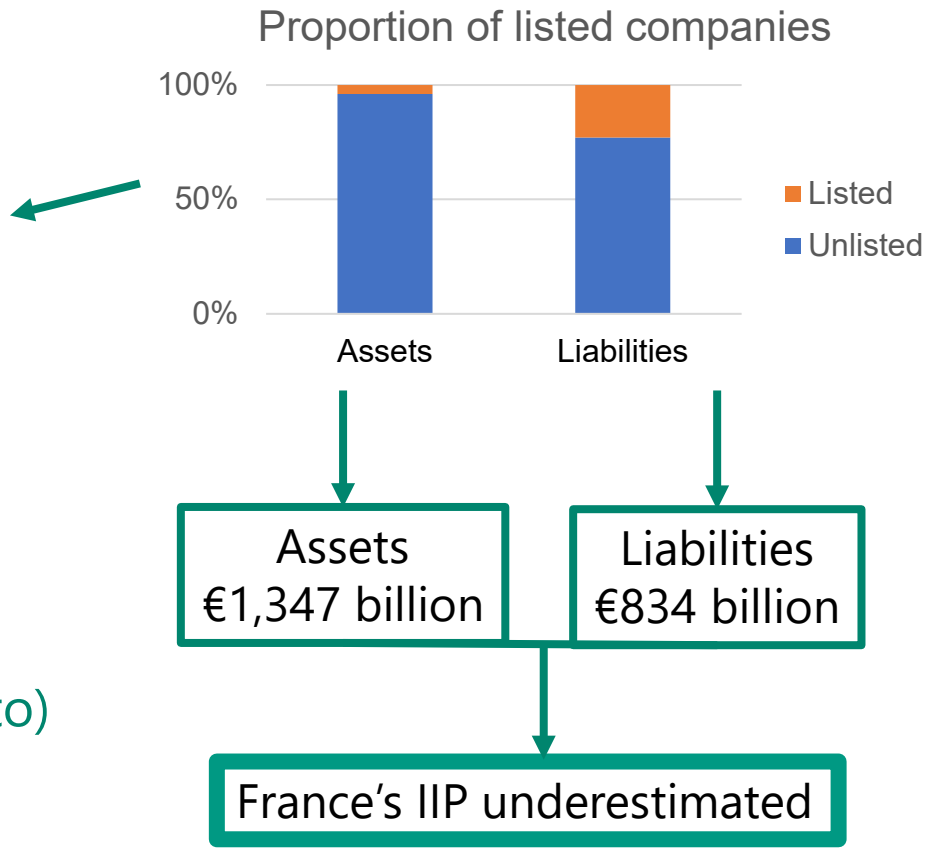
BACKGROUND

France's International Investment Position

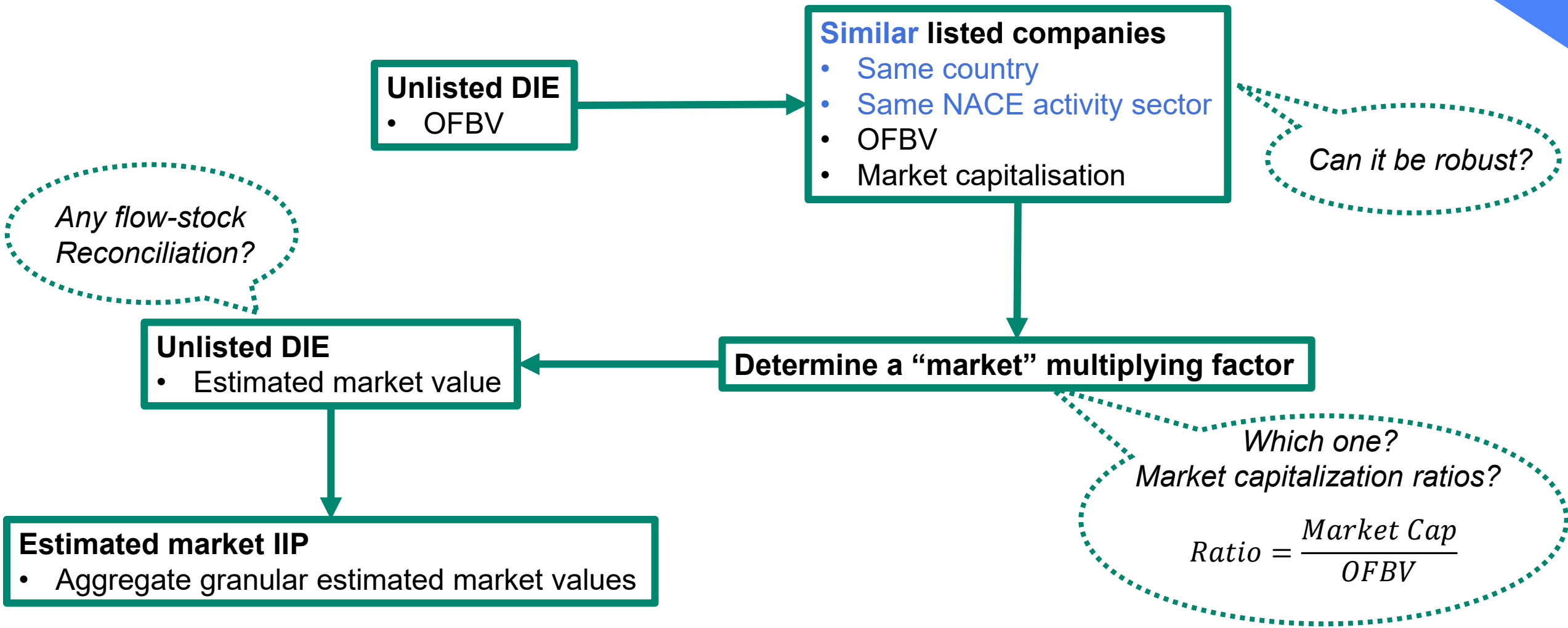
- **FDI** in equity at « mixed value »
  - Market value for listed companies
  - OFBV (Own Funds at Book Value) for unlisted companies

- Difference in valuation methods:
  - Market value > OFBV
  - OFBV reduces asymmetries
  - Market value closer to a "market price"

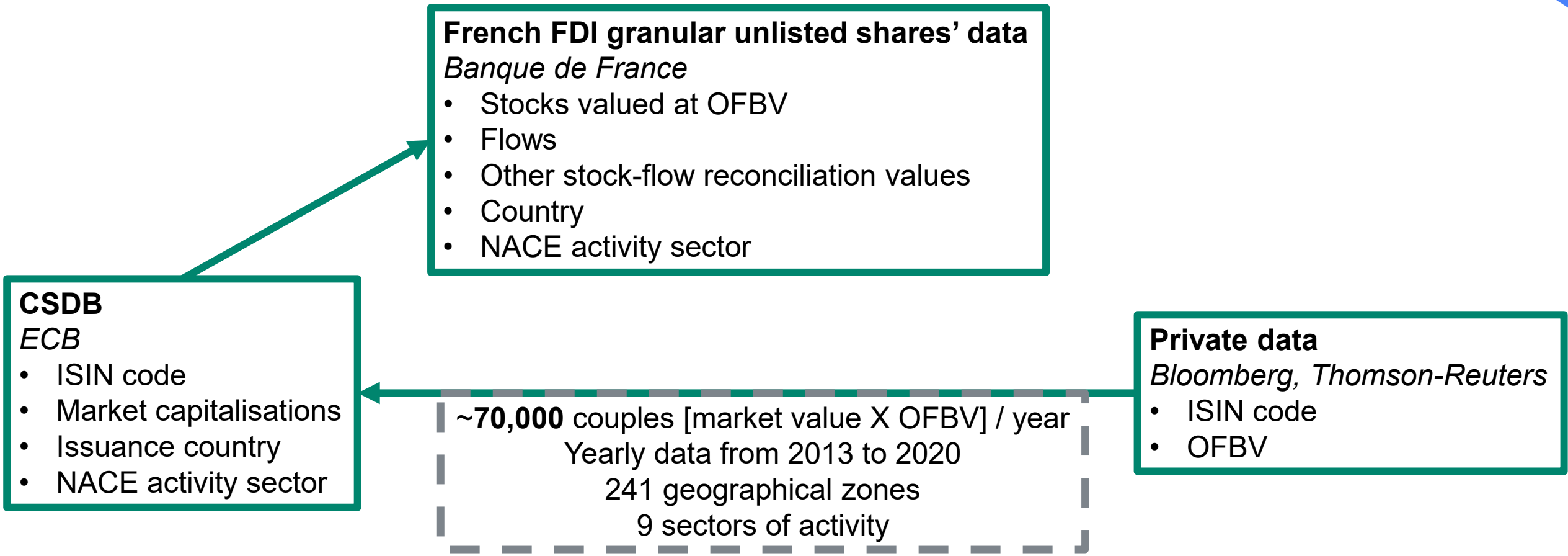
- Some countries publish two values for IIP (France used to)



MARKET VALUATION PRINCIPLE

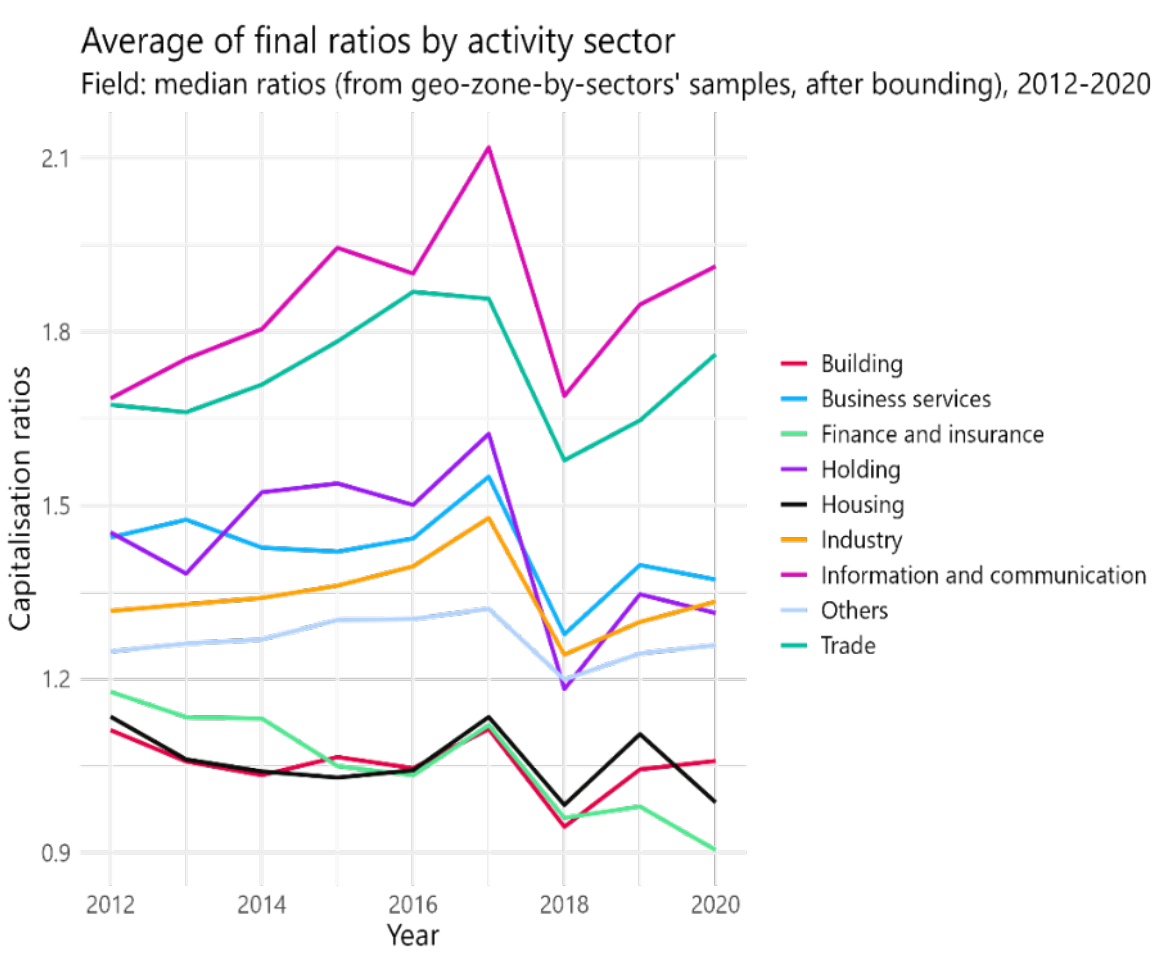


DATA MODEL FOR MARKET CAPITALIZATION VALUATION



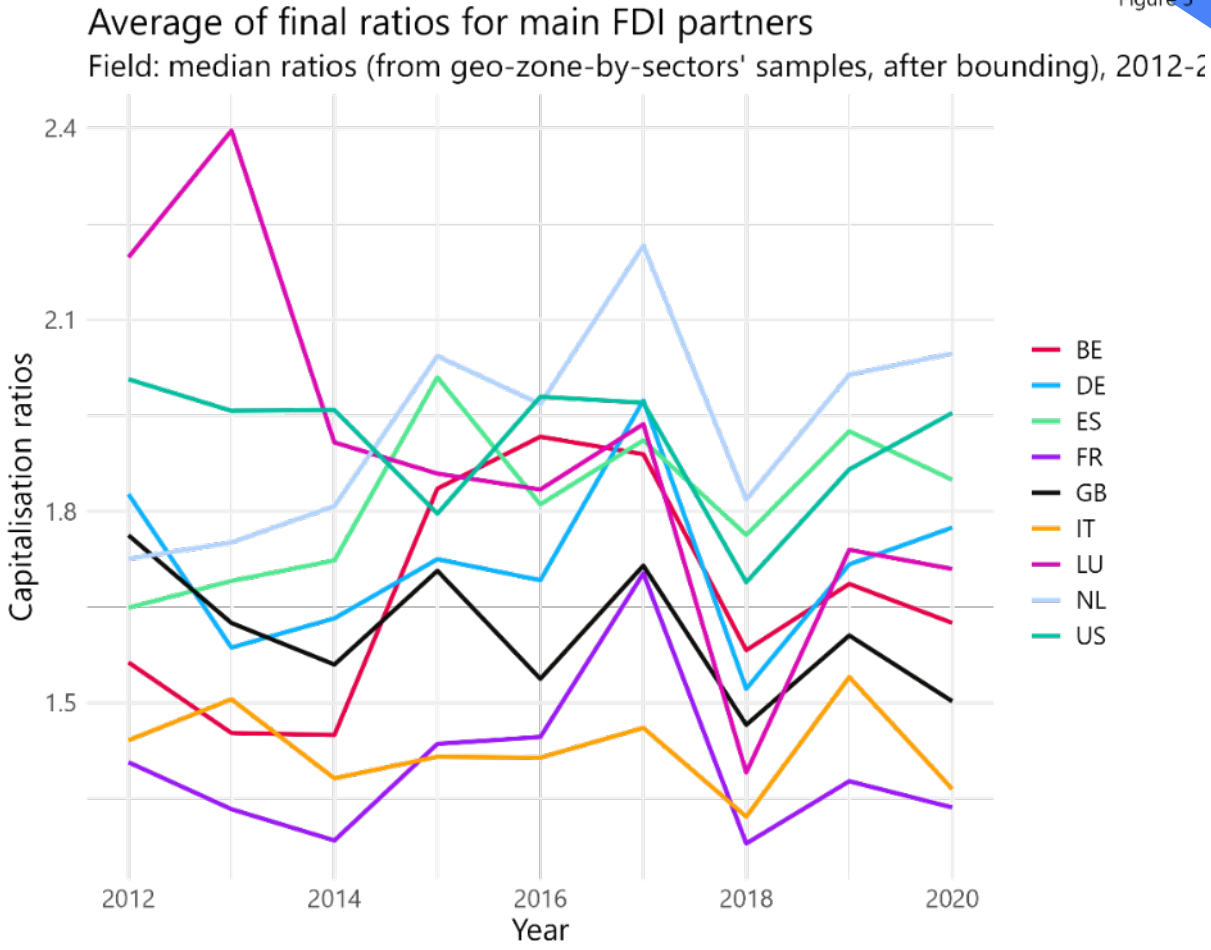
DIFFERENTIATION BY ACTIVITY SECTORS AND GEOGRAPHY

Figure 4



Sources: CSDB and Bloomberg data - Banque de France
Note: IT companies' ratios are higher than financial ones

Figure 5



Sources: CSDB and Bloomberg data - Banque de France
Note: ratios of Italy and France are relatively low.

DATA MODEL FOR MARKET CAPITALIZATION VALUATION

Data quality

- FDI granular unlisted shares' data
  - Banque de France
  - Reliable
- CSDB
  - ECB
  - Reliable
- Private finance
  - Bloomberg *vs* TR
  - Robustness check

Comparison over 3,000 companies
- *Ratios in $ from TR*
- *Ratios computed by us in € from Bloomberg data*

Median ratios' correlation: 0,98

  - Reliable

Data robustness

Distribution of individual market capitalisation ratios (2013-2020)	
Statistics	***Value***
Minimum	**0.00**
1st percentile	**0.00**
5th percentile	**0.16**
1st decile	**0.36**
1st quartile	**0.73**
Median	**1.34**
3rd quartile	**2.75**
9th decile	**5.76**
95th percentile	**9.86**
99th percentile	**41.17**
Maximum	**6 151 912.19**

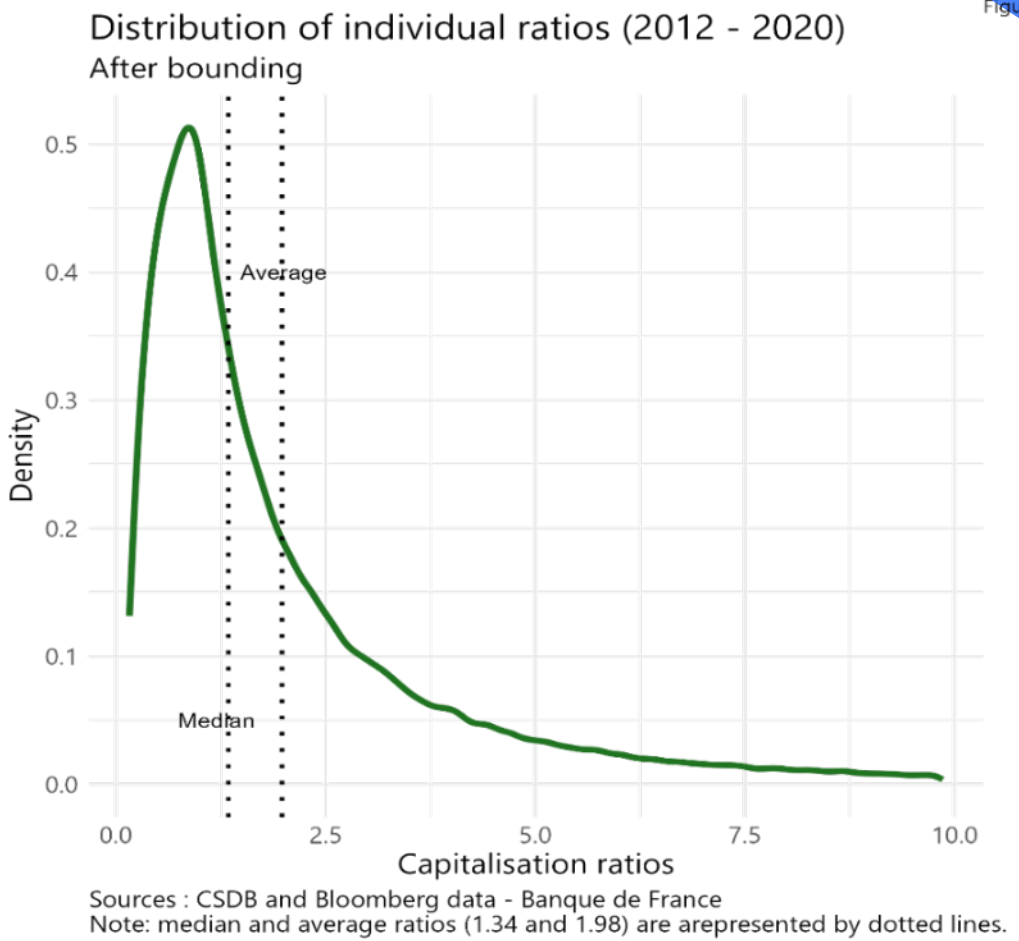
FROM INDIVIDUAL TO FINAL RATIOS

- Bounding from 5th to 95th percentiles
  - Symmetric bounds
  - Yearly bounds
  - Simulation with other bounds (1st-99th percentiles) leads to very close results

- Grouping by geo zone and activity sector
  - After grouping, yearly variations' range falls from [-1:10] to [-0,5:1] ⇒ no need to bound on variations

- Sample size
  - Aggregating to upper geo zone when crossing **[***activity sector* **X** *geo zone***]** size is too small
  - Minimum size **[***activity sector* **X** *geo zone***]** is 5

Figure 1



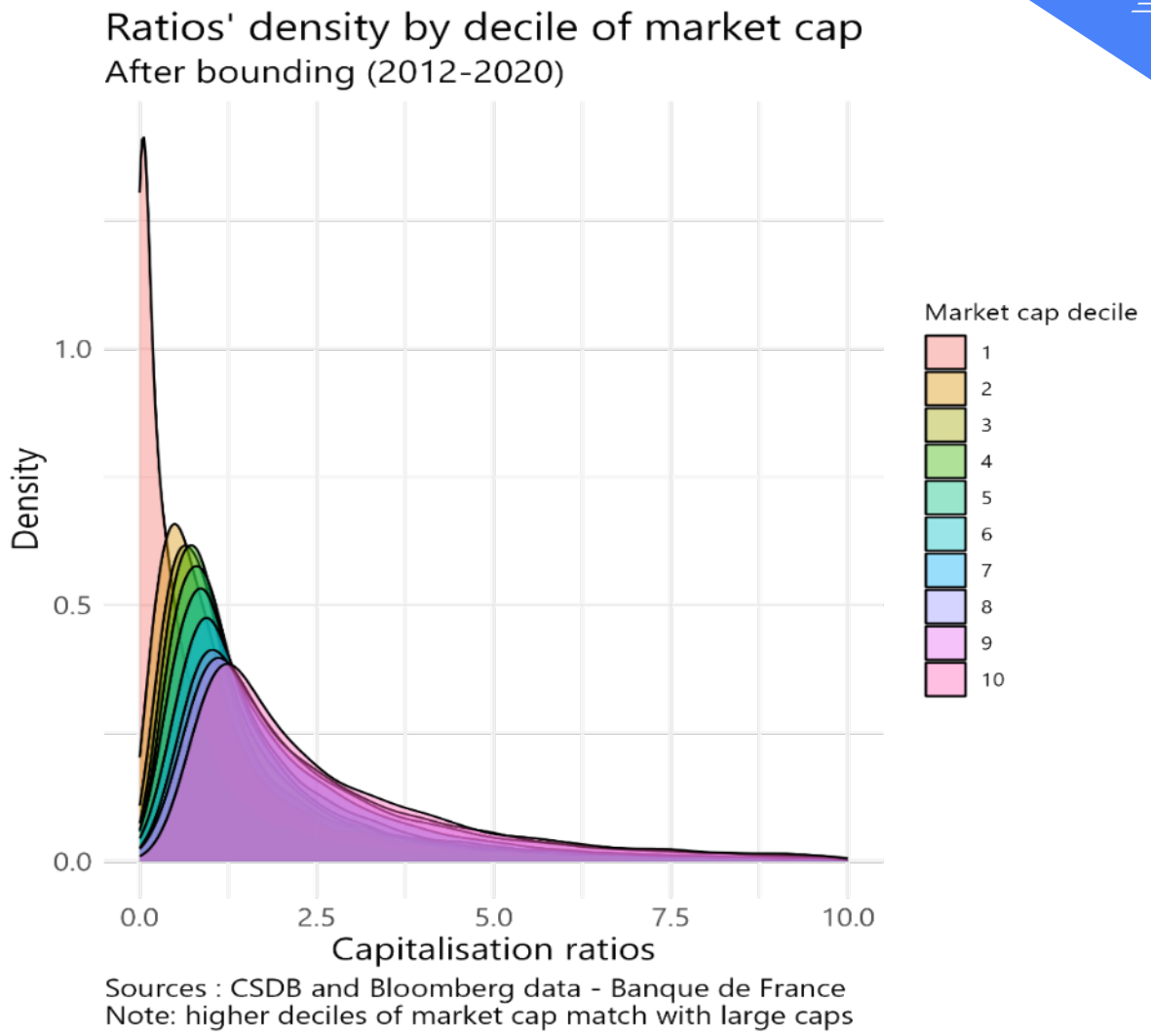
Sources : CSDB and Bloomberg data - Banque de France
Note: median and average ratios (1.34 and 1.98) are arepresented by dotted lines.

AVERAGE OR MEDIAN RATIO?

Size matters

- Unlisted DIEs
  - Are part of MNEs
  - Are closer to small and mid caps
- Small and large caps are different
  - Small caps have smaller ratios
  - Ratios' variations evolve differently
- Average higher than the median
  - Average represents better large caps
  - Median represents better small and mid
- No illiquidity discount
  - Values neither recent nor broken down

Figure



TWO MODELS

1) Ratios only

Every year

- Determine ratios from listed shares

$$R_{j,k,n} = {V^{ls}_{j,k,n}}/{U^{ls}_{j,k,n}}$$

- Apply ratios to DIE

$$V^{us}_{i,j,k,n} = R_{j,k,n} * U_{i,n}$$

Market value V

Book value U

Ratio R

Listed shares ls

Unlisted shares us

DIE i

Activity sector j

Geo zone k

Year n

Median $\tilde{\ }$

2) Ratios and price indices

1st year

Use ratios

From year 2

Use price indices

$$V^{us}_{i,j,k,n} = \frac{V^{us}_{i,j,k,n-1}\left({p_n}/{p_{n-1}}\right) + F_{i,j,k,n}({p_n}/{\bar{p}})}{1 + re_{i,j,k,n}({p_n}/{\bar{p}})}$$

Flow F

Retained earnings per share re

Price index p

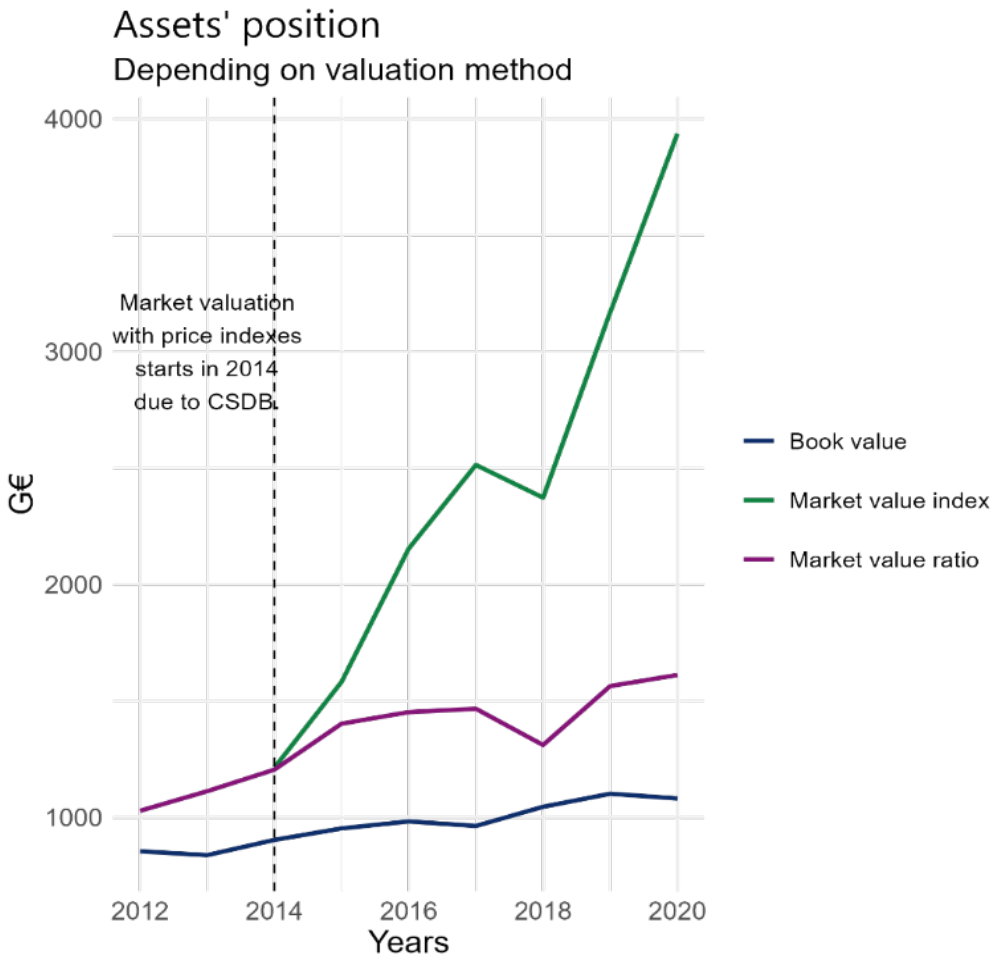
Yearly average $\bar{\ }$

~Same data

- Same listed companies used in both methods
  - Very large price indices
- Price indices start in 2014 since requiring monthly market capitalisation

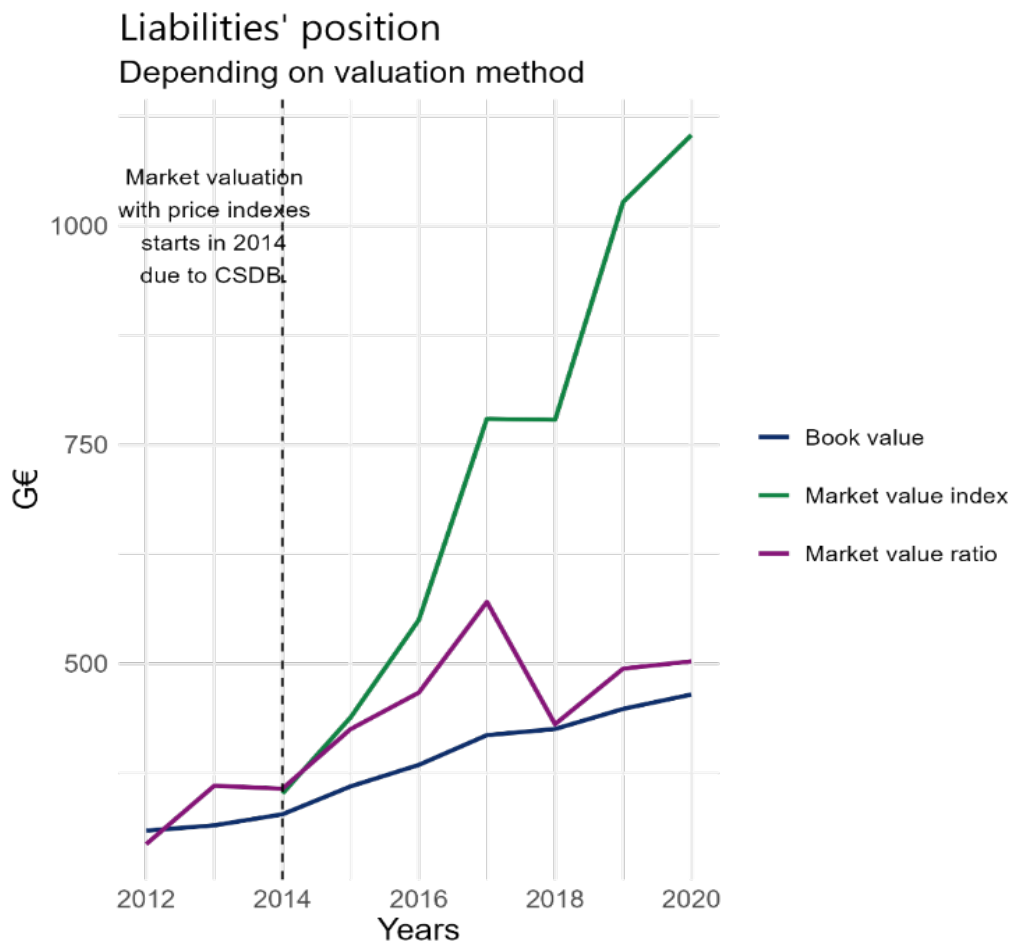
RESULTS

Figure 7



Sources: CSDB and Bloomberg data - Banque de France
Note: both market valuation methods lead to greater numbers.

Figure 8



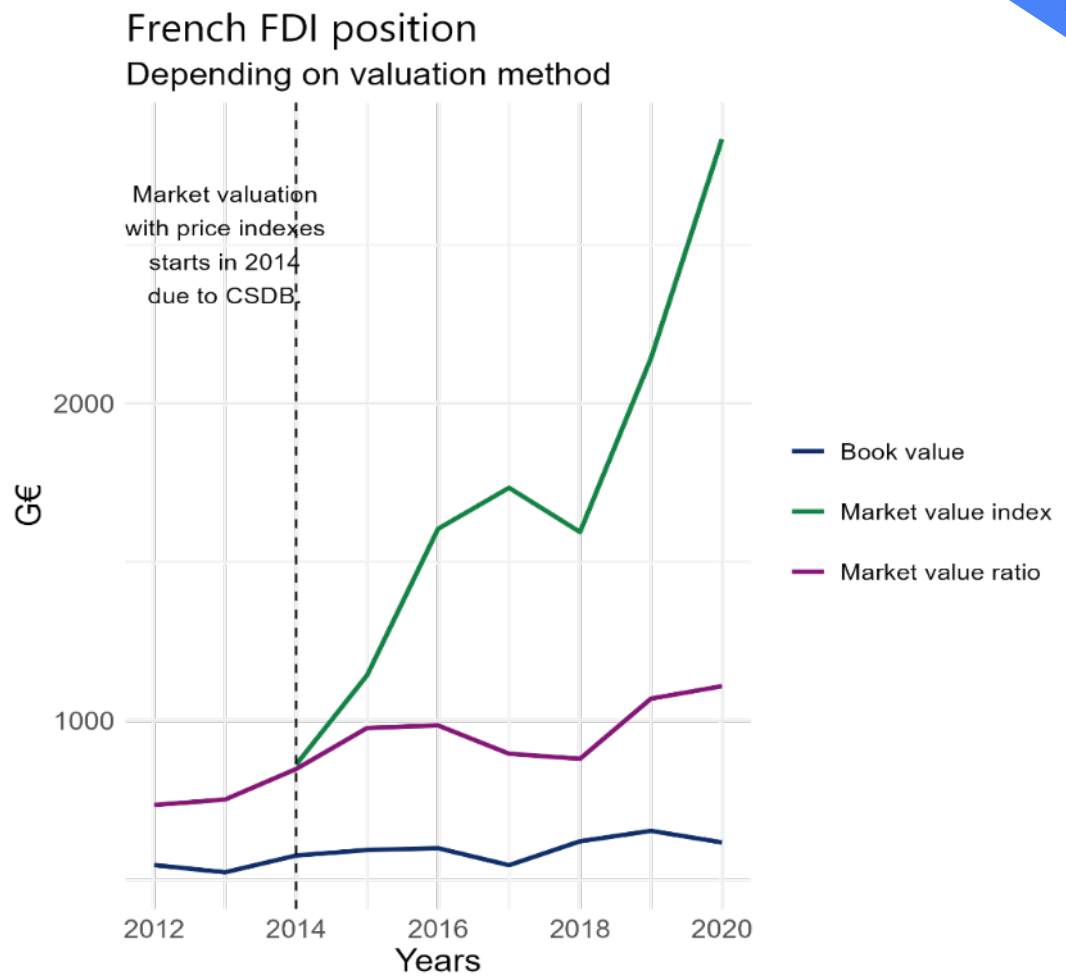
Sources: CSDB and Bloomberg data - Banque de France
Note: both market valuation methods lead to greater numbers.

INTERPRETATION

- Ratios' method
  - Level change
    - Most ratios > 1
  - Trends remain close
    - Median ratio closer to small and mid caps
      - Differences in ratios' variations between small, mid and large caps
    - Book value taken into account every year

- Price index method
  - Level change
    - From year 1, since using ratios
  - Trend change
    - Large caps contribute more
    - Book value not taken into account from year 2 (except flows)
      - Price indices make variations (and the trend)
    - *NB: an illiquidity discount could make sense from year 2 and would slightly reduce the trend*

Figure 9



Sources: CSDB and Bloomberg data - Banque de France
Note: both market valuation methods lead to greater numbers.

FLOW-STOCKS RECONCILIATION?

- Necessary?
  - Already done in book value
    - Quantities are well defined
    - Help at solving asymmetries
  - This estimated market value is more meaningful for aggregates

> *"any changes in the asset value that are due neither to transactions nor to revaluation. These changes include those due to cancellation and write-offs, economic appearance and disappearance of assets, reclassification, and the changes in financial assets arising from entities changing their economy of residence"*

- If yes, adjustment should be made between other changes and market effects
  1. All-valuation effect model
     - No change of other changes; market effects serve as an adjustment variable
  2. F511 model
     - Same definition of market effects as for listed shares; other changes serve as an adjustment variable
  3. Hybrid split model
     - Since flows don't change between valuation methods, this model suggests a way to assign the residual between other changes and market effects

CONCLUSION

- Our choice: ratios' method
  - Looks more reliable and better related to FDI values
  - And, robust enough thanks to big data

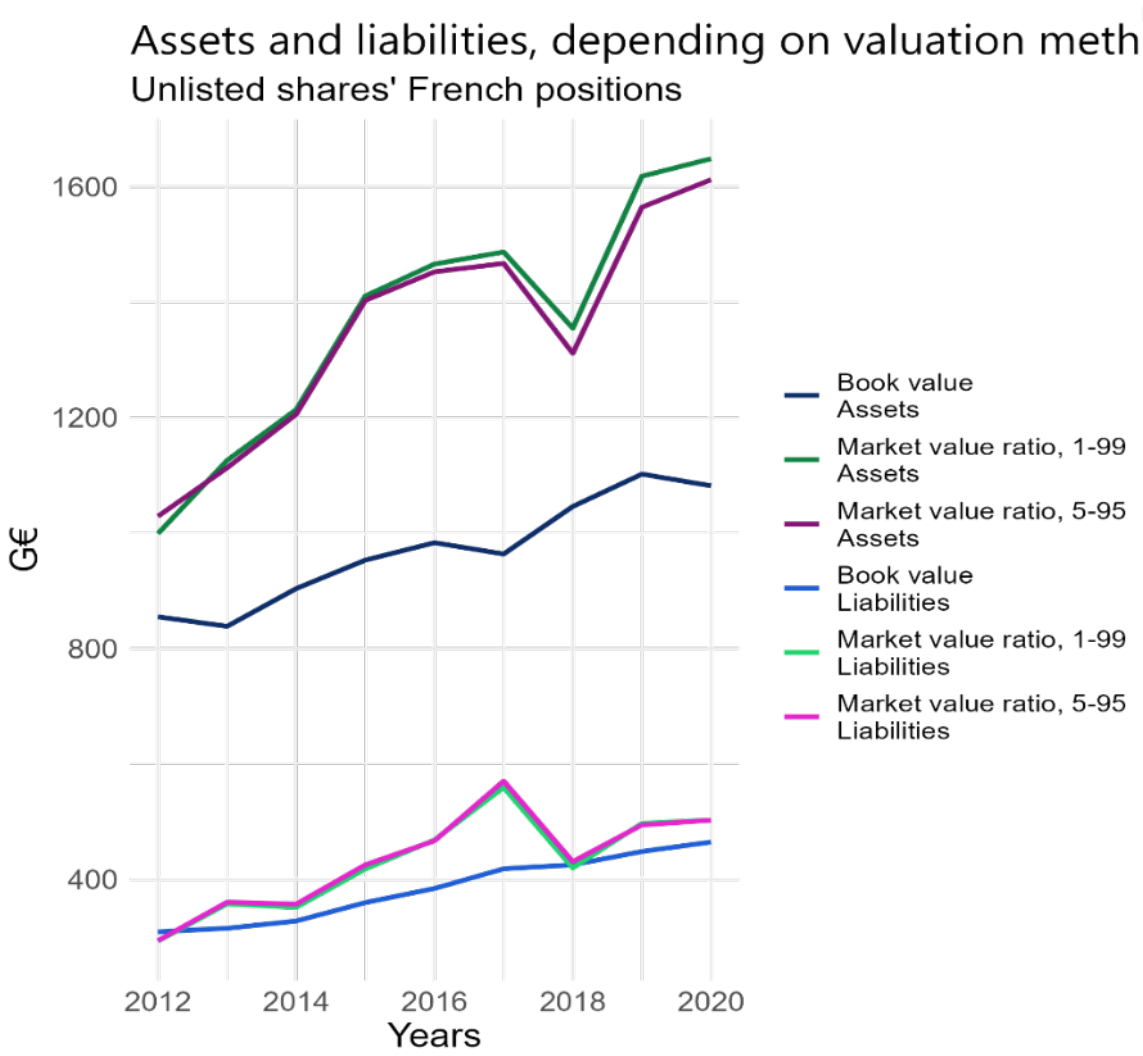
- Both methods can be easily replicated
  - Data availability
  - Simple methodology
    - ➢ Can be improved!

APPENDIX

BOUNDING IMPACT

Bounding individual ratios between 1st and 99th percentiles has a very low impact on final figures

Figure A1



Sources: CSDB and Bloomberg data - Banque de France
Note: 5-95 means bounding ratios between 5th and 95th percentiles.

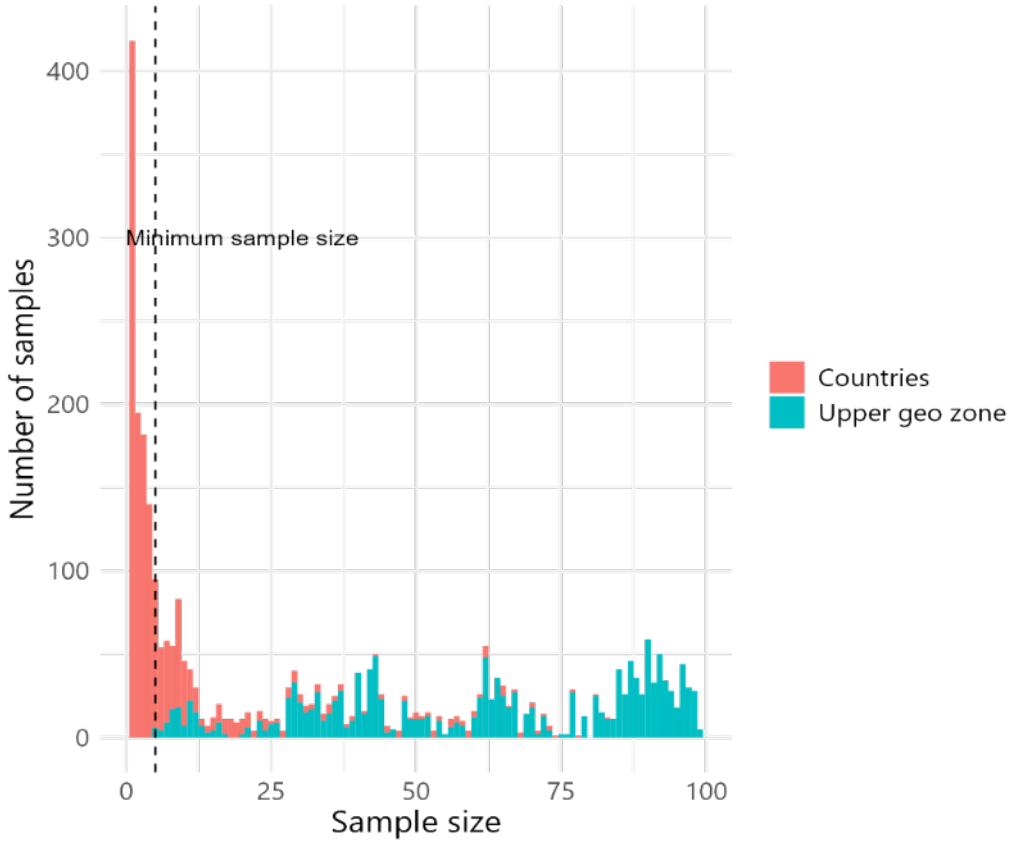
SAMPLE SIZE

The upper geo zone of France is Europe. For instance, if there are less than 5 listed companies for industry in France, we would consider listed companies for industry in Europe.

Figure 6

Sample size

Country-by-sector and upper-geo-zone-by-sector crossings.

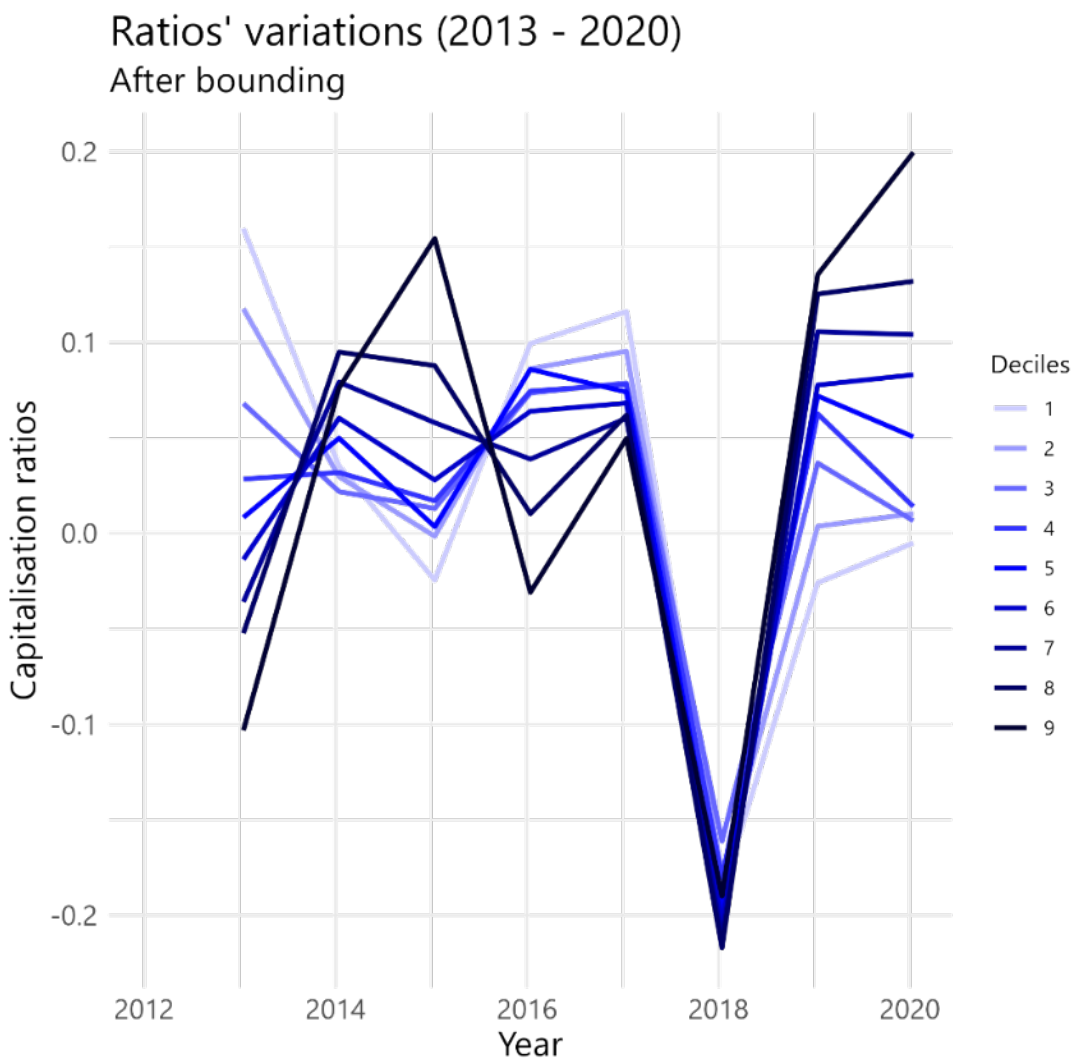


Sources: CSDB and Bloomberg data - Banque de France
Note: to facilitate readibility, samples of size lower than 100 are represented

RATIOS' YEARLY VARIATIONS

Ratios' variations are different depending on their market capitalisation

Figure 3



Sources: CSDB and Bloomberg data - Banque de France
Note: smaller and higher ratios might evolve differently.

FLOW-STOCKS RECONCILIATION – EQUATIONS

1. All-valuation effect model
   - $OC^V = OC^U$
   - $K7B_n = V_n - (V_{n-1} + F + \frac{\tau_n - \tau_{n-1}}{\tau_{n-1}} V_{n-1} + OC^U)$

2. F511 model
   - $K7B_n = \frac{R_{j,k,n} - R_{j,k,n-1}}{R_{j,k,n-1}} V_{n-1} = (R_{j,k,n} - R_{j,k,n-1}) U_{n-1}$
   - $OC^V = V_n - (V_{n-1} + F + \frac{\tau_n - \tau_{n-1}}{\tau_{n-1}} V_{n-1} + K7B_n)$

3. Hybrid split model
   - $OC^V = R_{j,k,n}\, OC^U + \left(\frac{R_{j,k,n} + R_{j,k,n-1}}{2} - 1\right) F$
   - $K7B_n = V_n - (V_{n-1} + F + \frac{\tau_n - \tau_{n-1}}{\tau_{n-1}} V_{n-1} + OC^V)$

X =

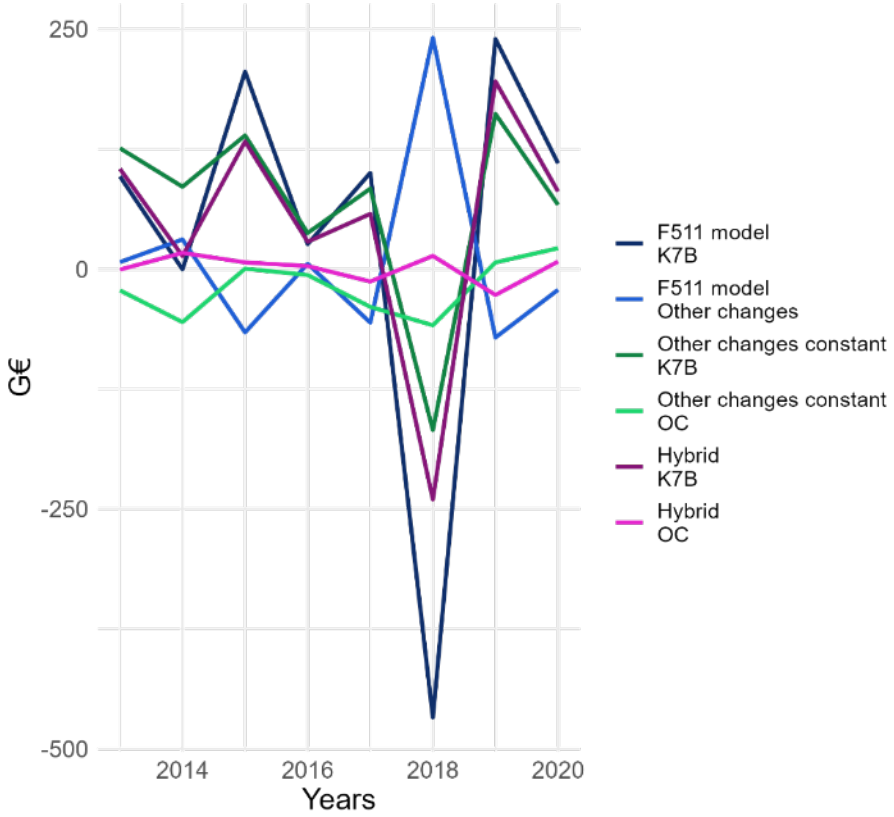
Year	OFBV	Ratio	Market	Flow	Residual
1	100	2	200	10	
2	110	2	220		**10**

FLOW-STOCKS RECONCILIATION – CHARTS

Figure 10

Market effects and other changes for assets' position

Depending on flow-stock reconciliation method



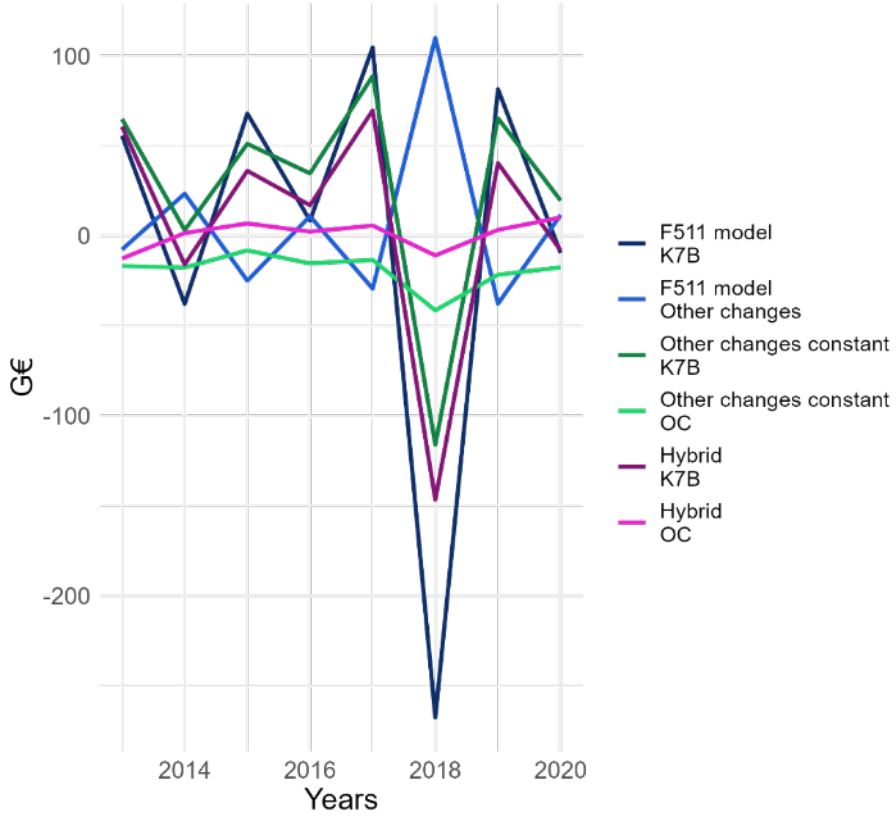
Sources: CSDB and Bloomberg data - Banque de France

Note: market effects and other changes compensate each other, whatever the methoc

Figure 11

Market effects and other changes for liabilities' position

Depending on flow-stock reconciliation method



Sources: CSDB and Bloomberg data - Banque de France

Note: market effects and other changes compensate each other, whatever the methoc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