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Lessons learned from the collapse of Archegos: policy and financial stability implications*

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1. Executive summary

In this note, we examine the failure of Archegos Capital Management (henceforth Archegos) in March 2021 to understand the potential **implications in terms of financial stability** for: i) **banks** offering prime brokerage services, ii) **market transparency** and iii) **non-bank financial intermediaries**.

Archegos was established in the US as a **'family office'** in 2013. Due to its classification, **it was not subject to registration of and/or disclosure and reporting duties** on its portfolio. Archegos' investments were concentrated in **Total Return Swaps**, brokered by a small number of banks. Swaps allow investors to take **huge leveraged positions**, while posting limited funds up front, and to maintain (in some cases) anonymity. The company had been flying under the radar until its bet on a specific stock ran into trouble and Archegos failed **to post the margin calls requested by the banks on which it relied**. This prompted its prime brokers (PBs) to liquidate their positions to reduce exposures. Though some of the intermediaries that served as Archegos' PBs incurred **high losses**, estimated at about $10 billion, **banks were resilient overall** and capital was sufficient to absorb these losses.

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This is a positive effect of the post-crisis regulatory reforms that have strengthened the capital position of banks, in particular the systemically important ones.

Nonetheless, policy-makers may draw lessons from the vulnerabilities that accumulated in the financial system and the extent to which they translated into risks to financial stability. Vulnerabilities might include those associated with:

i. ***Risk-management practices of PBs, relating in particular to collateral and margining practices***. Starting from the evidence relating to the collapse of Archegos, the authorities could enhance their efforts to better understand the adequacy of the amount of margins collected in the bilateral ecosystem, including their evaluation and management (e.g. contingency plans to liquidate collateral in an orderly manner in times of stress). The assessment of the risk management practices adopted by PBs should also consider whether the integration of risks from prime brokerage business into group-wide risk management is effective and whether the information collected by PBs to assess their client is adequate.

ii. ***The measurement and monitoring of the use of derivatives in the Non-Bank Financial Intermediation (NBFI) sector***. Archegos benefited from the delay in the implementation of some rules on disclosures of trading activities in the US, in particular those relating to swaps. In Europe, ESMA recently reviewed the quality of the data collected on derivatives transactions and concluded that, while good progress has been made, additional efforts are needed to close data gaps. In addition, the **authorities need to improve their ability to integrate and analyse data from different trade repositories (TRs)**, as their use is extremely complex, also due to the fact that reporting entities may be located in multiple jurisdictions, which makes the information fragmented.

iii. ***The regulation of family offices.*** Family offices are not subject to registration of and/or disclosure and reporting duties on their portfolios.[1] In Europe, 'family offices' do not fall under the regulatory perimeter of the Alternative Investment Fund Managers Directive (AIFMD) and are not subject to reporting obligations. The size reached by family offices – which according to market estimates manage around €40 trillion globally (of which 15 per cent in Europe)[2] – could justify the introduction of some regulatory safeguards, similar to the provisions for other investment instruments such as mutual or hedge funds, and **greater transparency on the activities carried out by these intermediaries in order to prevent possible impacts on financial stability**.

The note is organized as follows. Section 2 describes the core services offered by PBs, while section 3 recounts the main events relating to the collapse of Archegos; Section 4

1 The 2010 Dodd-Frank Act exempted family offices from registration to allow hedge funds and other private fund advisers with fewer than 15 clients to avoid having to register.

2 See Insead (2020).

concludes by discussing some issues that are worth being considered by policy-makers as they may be indicative of vulnerabilities in the financial system.

In the appendix, we provide further insights into more technical issues. In particular, these include: **the full spectrum of services provided by prime brokers** (Annex A); a description of **traditional securities financing transactions** (SFTs, Annex B), a description of **synthetic financing** (Annex C); and, finally, details about the **impact of the collapse of Archegos on the banking sector** (Annex D).

2. Prime brokerage services

Prime brokerage is a bundle of services provided by investment banks and broker-dealers to sophisticated investors, typically hedge funds, institutional investors and family offices, in exchange for a fee. Traditionally, prime brokerage has been a *financing business*, where a PB lends money or securities to its clients. Other related services include trade execution, clearing and settlement, customized technology to allow, for instance, real-time portfolio reporting, and capital introductions, i.e. PBs introduce their clients to qualified investors, business consulting firms and risk management support (Chung et al., 2021).[3] These services were originally used by PBs' clients to implement sophisticated trading strategies in equity markets, taking long or short positions, though over time they have extended to cover other financial markets, including fixed income, foreign exchange markets and over-the-counter (OTC) derivative contracts.

Prime brokerage is an important business for investment banks and securities firms, expanding in recent years. According to the Aite Group, prime brokerage services generated at global level revenues equalled about $30 billion in 2020 and recorded an 8 per cent compounded annual growth rate in the period 2015-2020.[4]

PBs offer their services to a variety of entities, but highly leveraged investors, like hedge funds, tend to rely more often on these relationships.[5] Indeed, these investors need to obtain financing through prime brokerage services because they carry high credit risk, which often makes them unable to borrow cash or securities directly from traditional intermediaries.[6] PBs provide two main types of leverage to their clients. The first one is financial (or balance sheet) leverage through securities

3 Through these services, a client is able to use multiple dealers to execute trades, while clearing and settlement rest with a single prime broker. For each eligible transaction, the prime broker interposes itself between the executing dealer and the client. The prime broker thereby assumes potential counterparty exposure vis-à-vis both the executing dealer and the client.

4 www.thetradenews.com/prime-brokerage-revenues-top-30-billion-2020-report-shows-banks-can-capitalise

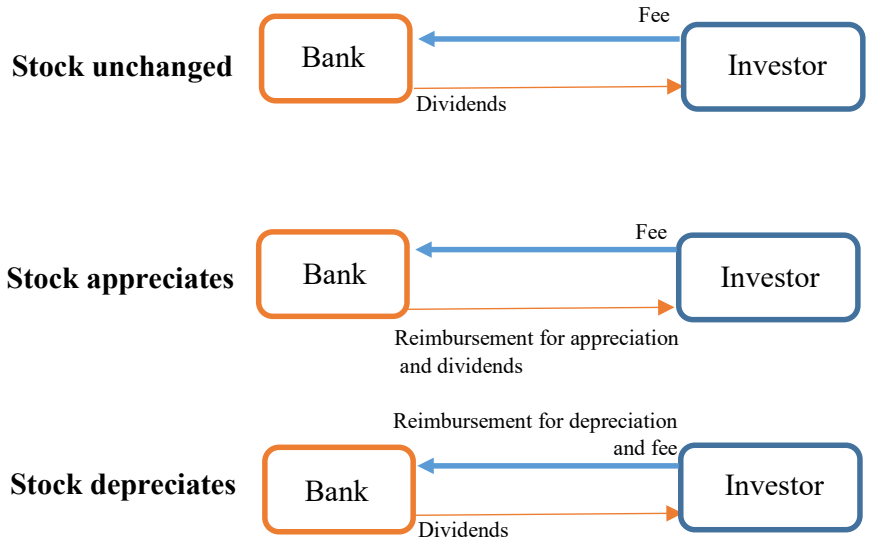
5 Traditional asset managers do not employ prime brokers, mainly due to the low leverage that characterizes their investment activities. Operationally, such asset managers tend to rely on custodians to process their OTC derivatives positions.

6 The hedge fund industry has been growing in recent years. According to the FSB (2020), hedge funds held more than $5.6 trillion of assets under management globally in 2019, from about $3.2 trillion in 2015; around 80 per cent of reported global hedge fund assets are in the Cayman Islands. In Europe, the hedge fund market is small, with assets under management accounting for around 3 per cent of the overall European fund industry (ESRB, 2020).

financing transactions (SFTs) and the second type is synthetic (or off-balance sheet) leverage, which is associated with the underwriting of derivative contracts.[7]

These derivative contracts include OTC (or bespoke) financial contracts (i.e. they are not cleared through a CCP) **such as total return swaps (TRS) – the derivative at the centre of the Archegos failure**. A TRS allows the investor to receive the *total return* from an asset without having its direct ownership. In the example, in Figure 1 the investor (i.e. the hedge fund) enters a TRS with a bank to take on a long position in a given stock, without purchasing it. Following the arrangement of the TRS, the investor (also known as the *total return receiver*) pays the bank a periodic fee and, in exchange, the bank (also known as the *total return payer*) commits to providing a reimbursement for appreciation if the price of the stock rises. Conversely, if the price of the stock falls, the investor pays the bank – along with the fee – a reimbursement for depreciation. In any case, the bank also provides the investor with any dividends that come from holding the stock.

Figure 1 – schematic representation of an equity TRS



From the PB perspective, the TRS generates revenues, but also potential risks arising from both adverse fluctuations in the asset price (market risk) and the possible default of the investor (credit risk). PBs usually hold the reference asset of the TRS and as a consequence, they are not exposed to market risk, only to credit risk. For this reason, in addition to fees, **PBs generally ask investors to deliver regular payments (from daily to quarterly frequency), i.e. margin calls, when the price of the asset decreases, to limit their exposure to their clients' default risk.** However, as a TRS is typically arranged for large notional amounts, **PBs would still be exposed to default risk** if the investor does not own enough capital to respond to margin calls.

7 For more information about PBs, see Annex A.

3. The collapse of Archegos

Archegos was founded in the US in early 2013, despite its founder Mr. Sung Kook 'Bill' Hwang being barred from managing client money since 2012, when he settled civil charges with the US securities regulators (SEC) in an insider trading investigation.

Archegos was established as a 'family office', with $100-200 million of capital; as such, it was exempt from SEC regulatory requirements.[8] In practice, Archegos could only manage money on behalf of 'family clients', had to be wholly owned by 'family clients' and controlled by 'family members', and could not work as an investment adviser. **'Family offices' are not specific to the US, but are found in many other jurisdictions**.[9] **INSEAD (2020) estimates that there are at least 7,300 'family offices' worldwide, one third of which are located in Europe**. Despite their participation in many financial markets, their ability to take on leverage and their links to large financial institutions, such vehicles are generally outside the regulatory perimeter, and not much is known about their size, nature and risk profile. Although most assets appear to be invested in traditional instruments, family offices also invest in alternative assets (e.g. private equity, hedge funds) and some directly engage in riskier hedge fund-like investment strategies.

Before the collapse, Archegos was estimated to have about $10-20 billion under management. **Its investment strategy consisted in taking exposure to global equities through TRS and contracts for difference**.[10] By mid-March 2021, thanks to leverage obtained by banks, Archegos might have had exposure up to $100 billion, invested in a concentrated basket of a few large Chinese tech-firms and US media conglomerates. According to media reports, **leverage was five times its capital**, meaning that it was granted up to $85 on a $15 collateral.[11] In some trades, leverage ratios may have been as high as 20 times this.[12]

Figure 2 shows a reconstruction of Archegos' portfolio, based on bank 13F filings, assuming a constant leverage equal to 5. Under this assumption, the value of a portfolio can shrink/increase very rapidly, even with only modest losses/gains in the value of the underlying assets.

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8 Single family offices are not regulated as they rely on an exemption from the 1940 Investment Advisers Act and may only advise 15 or fewer clients. Several hedge funds converted into 'family offices' following the enactment of the Dodd-Frank Wall Street Reform and Consumer Protection Act (DFA) of 2010 that introduced heightened regulation and scrutiny on hedge funds practices.

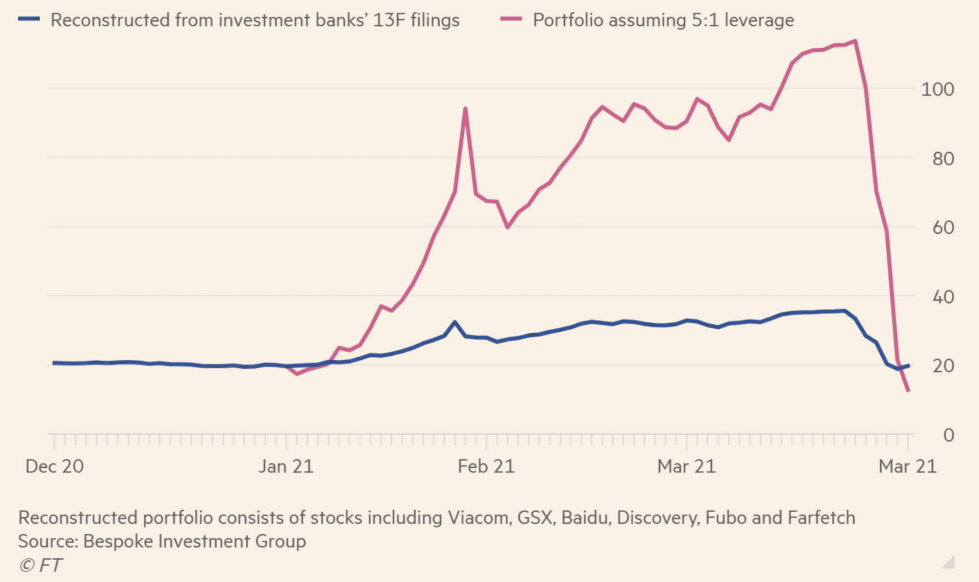
9 According to survey sources, family office headquarters reside in: North America (36 per cent), Europe (32 per cent), Asia-Pacific (24 per cent), and the Emerging Markets of South America, Africa, and the Middle East (7.8 per cent). Some 68 per cent of the family offices surveyed were founded in 2000 or later. See UBS and Campden Wealth (2019) 'The Global Family Office Report 2019'.

10 In contracts for difference (CFD) an entity receives (pays) the difference between the price of an equity security at contract maturity and the current price of the security if the price at maturity is higher (lower) than the current price.

11 Zuckerman, G., Chung, J., and Farrell, M. 'Inside Archegos's Epic Meltdown', April 2, 2021, Wall Street Journal, www.wsj.com/articles/inside-archegoss-epic-meltdown-11617323530. There are no regulatory minimum margin requirements for total return swaps for smaller financial firms (see Rennison, Joe, et al. 'US Put off Derivatives Rules for a Decade before Archegos Blew Up', April 12 2021, Financial Times, www.ft.com/content/7819e714-bf9d-4f83-a6e4-497df534f77c).

12 Kinder, T., March 29 2021, 'How Bill Hwang got back into banks' good books - then blew them up', Financial Times, www.ft.com/content/b7e0f57b-3751-42b8-8a17-eb7749f4dbc8.

Figure 2 – Archegos' reconstructed portfolio: the leverage downfall (in $billion)



Archegos gained large and undisclosed stakes in traded stocks without their direct ownership, magnifying its leverage by working with multiple PBs. Although there is no public record, the media identified Credit Suisse, Nomura, Goldman Sachs, Morgan Stanley, UBS, Mitsubishi UFJ, Deutsche Bank, Mizuho and Wells Fargo. Through its swap agreements, Archegos was estimated to have exposures to multiple companies' shares larger than 10 per cent of outstanding shares, and up to 25 per cent in some cases. Under the current supervisory rules, these exposures were undisclosed: first, they were held by a 'family office' with no need for public disclosure, and second, they had been obtained through derivatives contracts and not the ownership of equity.

Adverse price developments in a few stocks triggered large losses for Archegos. On March 24, 2021, ViacomCBS Inc issued secondary equity public offerings worth about $3 billion.[13] Unexpectedly, it fell short of its target by $300 million, which resulted in large price drops (a price decrease of about 23 per cent in one day).[14] In the same days, other stocks (e.g. Discovery, Iqiyi) experienced significant losses, possibly connected with Archegos' attempt to liquidate some of its investments in anticipation of margin calls. The growth in stock prices for all these companies had been substantial in the months preceding Archegos' failure, probably reflecting the ample liquidity available in financial markets.

13 https://www.businesswire.com/news/home/20210322005772/en/ViacomCBS-Announces-Offerings-of-Class-B-Common-Stock-and-Mandatory-Convertible-Preferred-Stock. A secondary offering is the sale of new or closely held shares by a company that has already made an initial public offering. Secondary offerings may be non-dilutive, i.e. a sale of securities in which one or more major stockholders sell all or a large portion of their holdings, or dilutive, i.e. a public sale of new shares.

14 Kelly, K., Goldstein, M., Phillips, M., and Sorkin, A. (2021, April 03). 'He built a $10 billion investment firm. It fell apart in days', from https://www.nytimes.com/2021/04/03/business/bill-hwang-archegos.html

Archegos defaulted on margin calls and PBs had to quickly reduce their unhedged exposures, but incurred severe losses. On March 25, Archegos held emergency meetings with its PBs to coordinate an orderly sale of its portfolio, but they failed to reach an agreement. As Archegos defaulted on margin calls, PBs had to rapidly cut down their (unhedged) exposure. The day after the meeting, the media reported an extraordinary $20 billion wave of block trades driven by Morgan Stanley (13$ billion) and Goldman Sachs (6.6$ billion).[15] The fall in the stock prices included in the Archegos portfolio was dramatic; according to media reports, the jump in trading volumes was steep, between 8 and 33 times higher than the 90-day historical average.

The sell-off continued in the following days. On March 29, prime brokers placed large block trades and the value of the Archegos portfolio fell further. Even two weeks after the trigger event, selling pressure continued, although volumes were normalizing. Over that period, the median price return for the stocks in the Archegos portfolio was about -40 per cent with ViacomCBS, Discovery, GSX Techedu, and Iqiyi all underperforming.

Archegos' links to multiple PBs – each of which probably had an incomplete view of Archegos' exposures and interconnectedness – may have exacerbated the impact of deleveraging on asset markets and on PBs themselves. Table 1 shows the banks' losses attributed to the Archegos meltdown and the size of the block trades as reported by various sources.

Table 1 – Archegos losses by bank

	Loss	Source	Date	Notes
Credit Suisse	$5.4 B	Economist	8-May	$2.3B in sales in VIAC, VIPS and FTCH
Deutsche Bank	-	BBG	1-Apr	Swift disposal of $4B of available-for-sale collateral
Goldman Sachs	-	FT	30-Mar	Immaterial impact. Block trades of $10.5B
Mitsubishi UFJ	$300M	BBG	1-Apr	
Morgan Stanley	$911M	MS	16-Apr	Very early secondary placement of $5B on March 25, $2B during the weekend, cushioned the impact
Nomura Holdings	$2.9B	FT	27-Apr	
UBS Group	$861M	FT	27-Apr	
Wells Fargo	n.a.	FT	30-Mar	Block trades of $2.1B
Total losses	**$10.3B**			
Total block trades	**$26B**			

Contagion to stock markets and other large banks was nevertheless limited. During the observed period, there was little sign of severe contagion to the wider stock market. Indeed, the S&P 500 Index and the Nasdaq 100 Stock Index were up 4 per cent; the MSCI China Index, after moderately correcting, was substantially unchanged. However, sector indices were affected. The S&P 500 Media Index sank in the observation period (-11 per cent). The MSCI China Tech 100 Index was down between

15 Barnert, J-P, F Pacheco and D Balji (2021) Traders are 'Glued to Their Screens' and Set for Volatile Open, Bloomberg.com, 28 March.

6 and 8 percent, but recouped its losses by the end of the observation period. **Large banks' performance did not affect the market or the broader bank indices in a noticeable way. However, the banks with the greatest exposure to the stocks in the Archegos portfolio underperformed in the market.**

4. Policy and financial stability implications

The financial stability risks associated with Archegos' collapse are amplified by the nature of prime brokerage activities. Only a few large lenders have the resources, in terms of balance sheet capacity and know-how, to offer these services, which inevitably leads to concentrating risks in a limited number of systemically important institutions. This was exactly the case in the Archegos failure, where a number of systemically important banks turned out to be indirectly highly interconnected through their common, and opaque, exposures to the same assets.

The significant amount of bank losses determined by the collapse of Archegos, estimated to be at least $10 billion (see Table 1), highlights the importance of analysing and possibly addressing a number of policy and regulatory issues.

First, **the appropriateness of the risk-management practices adopted by PBs, relating in particular to collateral and margining practices.** Competition among PBs may lead to a 'race to the bottom', in which brokers lower margin requirements and other risk-management practices to reduce costs for their clients unrelated to fees and commissions. Specifically, taking stock from the collapse of Archegos, authorities should better understand the adequacy of the margins collected in the bilateral ecosystem, including their evaluation and management (e.g. contingency plans to liquidate collateral in an orderly manner in times of stress). As noted in Section 2, the value of the Archegos portfolio had grown enormously in the months preceding the collapse, raising doubts about the potential build-up of excessively leveraged positions in the financial system.

One additional point concerns the **decision of the BCBS-IOSCO to postpone the implementation of the rules on margin requirements for OTC derivatives for relatively small financial firms, like Archegos, to September 2022 (from September 2020)**. Although some have argued that such a delay did not impact the Archegos case much,[16] according to the Financial Times, the postponement of the BCBS-IOSCO rules on margin requirements means that groups like Archegos are not currently required to follow a specific margin framework when they initiate a trade. Had the delay not been agreed, Archegos would likely have been subject to BCBS-IOSCO margin requirements if the value of its notional derivatives exposure had exceeded $8 billion. For example, the rules would have required enough cash to cover 10 days of possible losses, based on the historic performance of the shares.[17]

16 See Bartholomew H. and Mourselas C., 2021.

17 See Rennison, J, E Platt, C Smith and P Stafford (2021), 'US put off derivatives rules for a decade before Archegos blew up', Financial Times, 12 April.

The assessment of **the appropriateness of the risk-management practices adopted by PBs should also consider whether prime brokerage businesses are effectively integrated into group-wide risk management, and whether the governance and the information collected by PBs to assess the client are adequate**, which is a question partly linked to some issues about data collection on derivatives and large exposures (see below).

Second, **the measurement and monitoring of the use of derivatives and of large exposures in the NBFI sector. In relation to the use of derivatives, Archegos benefited from the delay of the implementation of the Dodd-Frank act, in particular the rules on disclosures of trading activities including OTC derivatives.** In fact, rules that require reporting of TRS transactions and positions into Trade Repositories (TRs) will come into force in the US in November 2021. While data from this source could advance the authorities' ability to monitor OTC derivatives markets, including detecting the build-up of highly concentrated exposure outside the banking system, their efficient use is complex.

In Europe, the European Market Infrastructure Regulation (EMIR) and the Securities Financing Transactions Regulation (SFTR) establish requirements for counterparties to report details of both derivatives and securities financing transactions to TRs respectively. TRs, in turn, make such data available to various European authorities and central banks depending on their mandate. The main objective for establishing the two reporting regimes was to increase the transparency of the derivatives and SFT markets and to improve the ability of European authorities to monitor systemic and financial stability risks (ESMA, 2021). Since 2014, all counterparties established in the European Union by virtue of the EMIR have been required to report details of any derivative contract they have concluded, modified or terminated, to a registered TR; reporting under the SFTR began very recently (July 2020). However, **ESMA recently reviewed the quality of the data collected under the two reporting regimes and concluded that, while good progress has been made (especially for the EMIR reporting), additional efforts are needed to further improve data quality.[18] In addition, supervisory authorities and central banks need to improve their abilities to integrate and analyse TR data, as their use is extremely complex also due to the fact that the data are often collected by entities located in multiple jurisdictions, which makes the information fragmented**.

In relation to large exposures, Archegos was not subject to any disclosure requirement, even if the actual position was large due to its use of TRS. In the US, institutional investment managers with beneficial ownership larger than $100 million in particular securities, which generally includes stocks that trade on an exchange, are required to report their securities holdings on a quarterly basis; in addition, any

18 For example, in the case of EMIR data, the report shows that: (i) around 7 per cent of daily submissions are being reported late by counterparties; (ii) up to 11 million of open derivatives did not receive daily valuation updates; (iii) according to ESMA estimates, there tend to be between 3.2 and 3.7 million of open non-reported derivatives on a given reference date during 2020; and (iv) around 47 per cent of open derivatives (corresponding to roughly 20 million open derivatives) are unpaired.

person that becomes the beneficial owner of more than five per cent of a class of an issuer's equity securities must report it to authorities. However, these obligations do not hold in the case of an exposure obtained without the outright purchase of equity securities. Furthermore, investors in TRS are exempt from disclosure, and therefore financial intermediaries may not know the total extent of their exposure to the financial industry. Although the Dodd-Frank Act introduced an ambitious regulatory framework on swap trades, this framework does not apply to total return swaps, as the rule on security-based swaps that the SEC approved at end of 2019 has yet to take effect. The rule contains provisions that would increase the transparency of these instruments for regulators and financial institutions. The SEC is now looking into new transparency rules that would include TRS, as chairman Gary Gensler told US lawmakers on May 6.[19]

Disclosure rules have a different regime in Europe. Under the European Transparency Directive (2013/50/UE), major shareholders – whether European entities or not – are required to notify their holdings on any European listed stock (which grants voting rights) to issuers and national competent authorities, provided that holdings exceed some predefined thresholds. Notably, these provisions also extend to any financial instrument which is referenced to the same shares and which provides a similar economic effect (and whether or not they confer a right to a physical settlement), thus including derivatives positions in TRS. Several countries in Europe, including Italy,[20] require the disclosure of a large position in any locally listed stock, even if it is acquired through a derivative. As a consequence, if Archegos had invested in European companies (both directly and indirectly via derivative contracts), then it would have been subject to this 'major shareholder' notification requirement, providing relevant information to issuers and competent national authorities.

Third, a number of **loopholes associated with the regulation of family offices** made Archegos' risk exposures totally opaque. Due to its classification as a family office, it was not actually subject to registration and/or disclosure and reporting duties on its portfolio. The 2010 Dodd-Frank Act in fact allowed registration and disclosures exemptions for family offices with fewer than 15 clients to avoid small hedge funds and other private fund advisers having to register. A limit based on the value of the managed portfolio would probably be more effective than a threshold calibrated on the number of clients. Nonetheless, even in a benign scenario with more information available to competent authorities, it would not be straightforward to analyse the information in a timely manner and respond accordingly, especially in a context of fragmented supervision as happens/is the case in the US. The non-bank intermediaries that provide investment services for wealthy individuals are not specific to the US, but exist in many other jurisdictions. Not much is known about their investments and they are generally outside the regulatory and supervisory perimeter of financial authorities. For example, in Europe, 'family offices' do not fall under the regulatory perimeter of

19 https://www.sec.gov/news/testimony/gensler-testimony-20210505

20 The Consob Regulation No. 11971/1999 ('Regolamento Emittenti', Articles 116-terdecies, 117, 119) refers to the notification requirements for financial instruments, including 'potential holdings and other long positions'; this includes 'financial derivatives, as well as any other contract [...], capable of determining the assumption of an economic interest that is positively correlated to the performance of the underlying asset'.

AIFMD and as a consequence they are not subject to the reporting obligations envisaged in this realm, although some information about their activities can be collected through supervised entities, thanks to the fact that family offices must go through an authorized intermediary to access regulated trading venues (MIFID2). The pace of family offices' growth has been significant in the last 20 years (INSEAD 2020) and there is evidence that several hedge funds in the US converted into family offices following the enactment of the Dodd-Frank Reform. The size reached by the family office sector, which according to market estimates manages around €40 trillion globally (of which 15 per cent in Europe),[21] could justify the introduction of some regulatory safeguards, similar to the provisions for other investment instruments such as mutual funds, and **greater transparency on the activities carried out by these intermediaries in order to prevent possible impacts on financial stability**. Furthermore, it could be important to investigate whether **the growth of family offices in recent years is somehow linked to the objective of circumventing regulation.**

21 See Insead 2020. These data refer to 2018, the latest available.

Annex A

Additional information concerning prime brokerage services

Prime brokerage services deliver several benefits to investors.

First, PBs provide a stable source of securities lending. Second, clients benefit from bilateral netting in the case of offsetting trades and portfolio margining. These practices lower the margin requirements on hedged positions and reduce potential liquidity risks from margin calls. Third, a prime brokerage arrangement can lower clients' operational costs and increase their operational efficiency by limiting the number of counterparties that they have to deal with.

However, despite the potential benefits of concentrating activities with a single prime broker, investors tend in practice to enter into multiple prime brokerage arrangements to negotiate (more) favourable fees and services, to keep their trading strategies more private and to diversify counterparty credit risks. For example, in Europe, the majority of hedge funds hold multiple prime brokerage arrangements, according to a recent survey by Deloitte (Deloitte, 2018). In particular, more than 80 per cent of survey respondents reported they had more than one prime broker relationship, ranging from two to seven counterparties; some respondents stated they rely on multiple PBs because of the niche specialisms or unique market access granted; others stated that they use multiple counterparties as a precaution for managing credit and counterparty risk. The survey covers seventeen PBs operating in Europe, among which there are some of the largest banks at global level, e.g. Deutsche Bank, Goldman Sachs, UBS, Credit Suisse and Société Générale. According to data from Coalition's prime brokerage rankings, JPMorgan, Morgan Stanley and Goldman Sachs have dominated the prime brokerage business for years, followed by Bank of America and Barclays. In Europe, following the acquisition of some businesses by Deutsche Bank in 2019, BNP Paribas is expanding its prime brokerage activity with the goal of becoming a global competitor.

Annex B

Traditional financing through Securities Financing Transactions (SFTs)

Traditional financing through SFTs includes margin loans, repos and securities lending. These instruments play a central role in the financial markets, allowing investors to access secured funding, supporting price discovery and the secondary market liquidity of the assets used as collateral. They represent a key channel for the transmission of monetary policy impulses. However, such transactions may also pose risks for the financial system, for example when used by market participants to take on excessive leverage, liquidity and maturity transformation activities.

Margin loans are secured loans that allow clients to finance the purchase of assets, generally stocks or bonds, by pledging the securities bought as collateral (a practice

called margin trading). For example, by using a margin loan a client can buy stocks worth €100 by paying only €50 and borrowing the rest using these stocks as guarantees for the loan. Margin trading requires investors to pay an initial margin upfront, which is calculated as a percentage of the value of the trade. Most importantly, borrowers are also subject to a 'maintenance margin', which varies over time and is calculated – typically with a daily frequency – as a percentage of the value of the securities bought at a given point in time.[22] For this type of loan, the margins are calculated at the portfolio level and are based on each PB's proprietary margin methodology; in addition to specific factors relating to the asset classes held in the portfolio, margins account for a number of other elements, including for example the counterparty credit risk profile (FSB, 2015).

Like margin loans, **repos** are a form of secured lending. An entity borrows cash by selling an asset, like a government bond, which is later repurchased at a prearranged price, either on a specified future date or on demand ('open' or extendable repos). From the perspective of the provider of the collateral, a repo is a source of credit; from the perspective of the entity receiving the collateral, a repo (called a reverse repo) is a form of lending. For bilateral (and tri-party[23]) repos, margining generally comes in the form of haircuts on the nominal value of the asset that secures the transactions.

Securities lending refers to a transaction where an entity (lender) lends specific securities to a counterparty (borrower) against the payment of a fee (or premium). In exchange for the securities, the borrower provides collateral, in the form of cash or non-cash. The collateral may be of equal value to the securities lent, or, more frequently, of greater value, depending on the applied margin or haircut. Frequently, custodian banks operate securities lending programmes on behalf of their customers (beneficial owners), although there might be other types of firms operating as securities lending agents (FSB, 2015).

Securities lending and repo transactions are generally conducted under bespoke agreements, based on industry standards, called master agreements. In contrast, margin lending is governed by margin agreements that could differ across brokers and jurisdictions. Moreover, while repo and securities lending usually involves the temporary transfer of the title and/or of all the interests and rights of the security pledged as collateral, margin lending only provides the lender with the right to rehypothecate the collateral.

Through rehypothecation, securities that serve as collateral for a secured borrowing (for example, in the case of a margin loan extended to a fund) are further used by the dealer or bank making the loan. Frequently, the collateral taker in the first transaction

22 For example, for an asset that costs €10,000 with an initial margin of 50 per cent and a maintenance margin of 25 per cent, the investor would have to post €5,000 upfront. If the value of the asset lost €4,000 (to €6,000), the investor would be left with only €1,000 of margin in the account. Since the maintenance margin is 25 per cent, the investor would be under the minimum required equity (0.25 * €6,000 = €1,500) and would receive a 'margin call' for an extra €500 to be put in the account.

23 A Tri-party repo is a transaction for which post-trade processing – i.e. collateral selection, payments and deliveries, custody of collateral securities, collateral management and other operations during the life of the transaction – is outsourced by the parties to a third-party agent.

pledges the securities to one or more third parties to obtain financing for the margin loan or uses them to facilitate other transactions for clients (e.g. short sales; FSB, 2017). In this way, financial institutions fund the loans provided to their clients and eventually reduce the cost of funding, although this practice may be restricted by contract or regulation. In some instances – where permitted by the relevant regulatory regime – financial intermediaries may use client securities to finance other activities not directly related to the client itself, including inventory or proprietary trading positions. Rehypothecation of assets can pose financial stability risks, especially if clients are uncertain about the extent to which their assets have been rehypothecated and/or about the treatment in the event of bankruptcy (FSB, 2017).

As noted, banks' prime brokerage services are the main source of financing for leveraged investors, such as hedge funds. To implement their strategies, leveraged investors rely on PBs to borrow both cash (to take long positions) and securities (to take a short position). In particular, leveraged investors tend to use the securities lending and margin loan facilities[24] of their PB to finance positions in equities and high-yield corporate bonds (Bank of England, 2017). To acquire leveraged long positions through secured financing, they deal with PBs to receive cash loans and pledges previously acquired assets as collateral (Hespeler and Witt, 2014). The securities serving as collateral are held in margin accounts. Using leverage, the investors take on exposures that are greater than their capital, thereby amplifying potential returns and taking advantage of small mispricing opportunities. However, leverage can also magnify losses in the case of adverse events.

Annex C

Synthetic financing

Synthetic (or off-balance sheet) financing relies on the use of derivatives to provide leveraged exposure to an underlying asset without actually having to buy the asset itself. This practice requires the borrower to post an initial margin at the counterparty, which is generally expressed as a percentage of the notional value of the derivative contract.[25] For example, a prime broker entering a derivative with its client with a notional value of €10,000 may ask the client to post a 10 per cent initial margin (€1000). Synthetic leverage can be measured in a number of different ways, for instance: i) the ratio of notional value to the initial margin, ii) the ratio of a fund's gross notional exposure (GNE), i.e. the sum of the market value of assets and the notional amounts of derivatives, to its net asset value, and iii) the Value at Risk (VaR) on a fund's whole portfolio, including derivatives.[26] All these measures are subject to some limitations in terms of their ability to capture the full range of financial risks associated

24 Margin loans and securities lending are generally called margin financing.

25 The notional value is the amount of the underlying asset referenced by the derivative.

26 A common way to capture synthetic leverage is by calculating cash-equivalent portfolios. See Breuer, P (2002).

with derivative exposures.[27] Following a recommendation from the FSB, the authorities (led by IOSCO) published a two-step framework in 2019 to facilitate more meaningful monitoring of leverage, recommending that regulators use the GNE or adjusted-GNE as a baseline analytical tool.

For PBs, synthetic financing through TRS represents an alternative to traditional securities financing. The Bank of England (2017) reports that the use of synthetic prime brokerage has grown considerably in recent years; the notional value of synthetic positions as a percentage of total positions, both cash and synthetic, increased by about 6 percentage points over the years 2013-2017.[28] According to McNamara and Metrick (2019), this trend may be related to the fact that the costs in terms of capital and liquidity requirements for dealers of providing leverage through a TRS are lower than those associated with using traditional securities financing. Internal analyses at the Bank of Italy suggest, however, that this statement may be incorrect, i.e. it is not possible for dealers to arbitrate between synthetic and traditional securities financing as there is no comparative advantage in terms of the capital and liquidity requirements of the former type of funding.

Annex D

Further details about the Archegos collapse and its impact on the banking sector

Overall, after the collapse of Archegos, banks involved in transactions with this family office managed to place about $26 billion in block trades in the space of a few days for a total estimated loss of about $10 billion. Total reported losses among PBs varied unevenly depending on, among other things, the size of the unhedged portfolio, speed and placement strategies, and the contractual obligations. For instance, as the discussion on an orderly liquidation faltered, Morgan Stanley managed to sell $5 billion of the Archegos portfolio on March 25, ahead of the sell-off, to a restricted group of hedge funds, temporarily shielding the market from the problem. Goldman Sachs and Deutsche Bank were also very fast in selling their holdings associated with Archegos, thus limiting their losses. However, other prime brokers, namely Credit Suisse and Nomura, were hit significantly. Credit Suisse disclosed losses higher than $5 billion connected with Archegos.[29] Nomura suffered significant losses too (about $3 billion).[30]

27 For example, while a measure based on the notional value is likely to overestimate the potential market risk associated with a derivative contract, the use of gross notional exposure provides little information on the underlying risk factors; at the same time, it does not distinguish the purpose of the exposure itself, i.e. hedging or investment.

28 This estimate is based on the Hedge Fund as Counterparty Survey, a survey conducted by the Bank of England, based on data and information from twelve PBs that have trading relationships with hedge funds via repos, secured financing and derivatives.

29 Archegos generated only $17 million in revenues for Credit Suisse in 2020. Hwang is not a client of its private bank. Halftermeyer, Marion, 'Credit Suisse Gave Archegos Big Leverage for Little Collateral' www.bloomberg.com, 3 May 2021, www.bloomberg.com/news/articles/2021-05-03/credit-suisse-gave-archegos-big-leverage-for-little-collateral.

30 According to people familiar with the matter, Nomura held emergency talks with Japan's Financial Services Authority before disclosing its exposure on Monday.

Credit Suisse and Nomura stocks were the worst performing at the end of the observation period (-17 per cent and -15 per cent respectively) and recorded above average trading volumes. **Credit rating agencies downgraded the outlook for Credit Suisse and Nomura, citing concerns over 'the quality of risk management'.**[31]

A week after the trigger event, the Financial Stability Oversight Council, chaired by US Treasury Secretary Janet Yellen, reconvened its hedge fund oversight group for the first time since 2016 to assess the risk taken by leveraged investment vehicles.[32] The SEC privately briefed the House Financial Services Committee on April 7. In that meeting, the SEC's ability to monitor Archegos' swap positions, as well as its oversight of 'family offices', were questioned.[33] **SEC officials conceded that the agency knows little about family offices' trading activities.** At the same time, the Federal Reserve started looking into banks' risk management practices, in particular regarding their evaluation of the level of hedging and the collateral needed to protect them in a potential liquidation scenario.

In the second half of April, Credit Suisse raised $1.9 billion to strengthen its capital in response to the Archegos trading losses.[34] At the end of April, Jerome Powell, chair of the Federal Reserve, dismissed a question about the Fed's inability to identify the extent of the banking system's exposure to Archegos, but mentioned that the Fed is looking into potential weaknesses in the risk management of some banks.[35]

In its May semi-annual report on financial stability,[36] the Fed warned that 'available measures of hedge fund leverage may not be capturing important risks'. Referencing a few recent episodes that have highlighted the need for 'greater transparency at hedge funds and other leveraged financial entities', the Fed noted that 'while broader market spillovers appeared limited, the [Archegos] episode highlights the potential for material distress at nonbank financial institutions to affect the broader financial system'.[37] On May 7, Gary Gensler, the newly appointed chair of the SEC, told the House Financial Services Committee that he had asked staff to 'consider

31 Stress in the risk management offices of large banks has emerged. Credit Suisse, which had already seen some questionable risk management practices (e.g. Greensill Capital and other scandals), announced the resignation of seven senior executives, traders and risk managers including the head of the investment bank, Brian Chin, and the chief risk and compliance officer, Lara Warner. The bank announced a loss of $800 million for Q1 2021 due to the fire sale liquidation of the Archegos portfolio and losses connected with the Greensill scandal, cut its dividend proposal for 2020, suspended its share buyback, and scrapped top executive bonuses for last year. Nomura appointed Christopher Willcox, the former head of JPMorgan Asset Management, as the co-chief executive of its US unit.

32 Politi, James, and Gary Silverman, 'Fed Warns of Hidden Leverage Lurking in Financial System', www.ft.com, 6 May 2021, www.ft.com/content/cd723c4e-b182-416c-b511-bd3d516978d3.

33 Schmidt, Robert, et al., 'Archegos Exposes SEC Blind Spots, Dithering on Market Oversight', Bloomberg.com, 9 April 2021, www.bloomberg.com/news/articles/2021-04-09/archegos-exposes-sec-blind-spots-dithering-on-market-oversight.

34 Walker, Owen, 'Credit Suisse to Raise $1.9bn of Capital as It Reels from Archegos Losses'. Financial Times, 22 April 2021, www.ft.com/content/c7a958d0-3fc0-456a-9f01-3077b772e41b.

35 'Transcript: Fed Chief Powell's Post meeting Press Conference', Wall Street Journal, 28 April 2021, www.wsj.com/articles/transcript-fed-chief-powells-postmeeting-press-conference-11619644895.

36 'Financial Stability Report', Board of Governors of the Federal Reserve System, May 2021.

37 Lael Brainard, Chair of the Fed's financial stability committee, noted in her statement published with the Financial Stability Report of May 2021 that 'the potential for material distress at hedge funds to affect broader financial conditions underscores the importance of more granular, higher-frequency disclosures'.

recommendations for the Commission about whether to include total return swaps and other security-based swaps under new disclosure requirements, and if so how'.[38]

Meanwhile, PBs are reviewing their practices. Credit Suisse announced they will scale down their prime brokerage business by one third, while other banks are reviewing their prime brokerage relationships, stress-testing methodologies and how they determine the margin for their clients' portfolios.[39]

38 'Testimony before the House Committee on Financial Services', 6 May 2021, www.sec.gov/news/testimony/gensler-testimony-20210505.

39 Steinberg, Juliet, Julie Chung and Gregory Zuckerman, 'Banks in Archegos Aftermath Tighten Credit Lines, Scrutinize Swaps', Wall Street Journal, 5 May 2021, www.wsj.com/articles/banks-in-archegos-aftermath-tighten-credit-lines-scrutinize-swaps-11620212400.

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